Tranquillon Ridge Prospect

Volume II

Drainage of the Tranquillon Ridge Prospect

By

The Point Pedernales Oilfield

Prepared for:

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Important Note

Opinions expressed in this report are based on the data furnished to NAFT Consulting by various reliable sources. Except for production data, most raw data submitted is of confidential nature. Every effort has been made to preserve the confidential nature of such data in this public document.

Nomenclature:

bbl and Bbl =barrel

BOE= barrels of oil equivalent

BSCF= Billion standard cubic feet

CUM= cumulative

GOR= gas oil ratio in SCF/STB

FMI=Formation Microscanner (well log)

IP= initial productivity, Bbls/well/day

MSCF = 1000 standard cubic feet

NGL= Natural gas liquids (Heavier gaseous hydrocarbons: ethane, propane, normal butane, isobutane, pentanes and higher molecular weight hydrocarbons.)

R_d= Drainage Radius (equivalent of a cylindrical shaped drainage volume)

SCF= standard cubic feet

STB = stock tank barrel

WOR= water oil ratio, dimensionless

Contents

Executive Summary

Volume II is an extension of the Volume I public report on the oil and gas reserves of the Tranquillon Ridge side of the structure with a focus on potential drainage by the operation of the Point Pedernales side. The potential mechanisms of such drainage have been examined and are discussed in this report. Volume II also addresses the potential development of Tranquillon Ridge from the perspective of proposal submitted by Sunset Exploration/ExxonMobil (the Vahevala Project) with estimates of future production and resource recovery.

Based on further analysis of seismic data and diagnostic mapping of performance data, we have reached some important conclusions:

1- The production from the Point Pedernales side has benefitted from a common aquifer shared with the Tranquillon Ridge side and has caused the drainage of substantial natural water drive energy resulting in potential long term recovery losses for future producing reserves of proposed Tranquillon Ridge operations in State waters. Continuation of Point Pedernales operations is putting at risk the recovery of about 260,000 barrels of recoverable oil per month of State oil reserves by wasting reservoir energy.

2- Under the Sunset/ExxonMobil development proposal, where 30 wells are planned to produce within a 30 year operational life, based on the mean value of well productivities in analog fields producing from the Monterey Formation and which show no evidence of prior losses by drainage, we have calculated the expected maximum recoverable oil to be around 180 million barrels. Discounting the ultimate recovery losses by the drainage of aquifer drive energy, we have computed a maximum of 150 million barrels of oil and associated gas and natural liquids. Ultimate recoveries can be higher by the virtue of more oil in place.

As indicated in Volume I of our study, drilling of initial delineation wells is necessary to further update the above estimates.

Introduction

The main purpose of this study is to determine if drainage from the Tranquillon Ridge side of the structure is occurring because of production by the Point Pedernales operations, explain the mechanism for such drainage, if occurring, and provide engineering estimates of the potential oil and gas reserves of the reservoir side in State waters which are being or could be drained.

For development of the state oil and gas reserves in the "Tranquillon Ridge" area, the California State Lands Commission (CSLC) has received a proposal from Sunset Exploration and ExxonMobil (Sunset Vahevala Project).

The secondary purpose of the study is to evaluate the potential resource recovery and performance of Tranquillon Ridge side under the Sunset/ExxonMobil Vahevala Project proposal. This proposal calls for directional drilling of up to 30 wells from an onshore drilling and production facility located on the Vandenberg Air Force Base. The project has a projected life of 25-30 years. According to the proposal, produced water would be removed from the oil/water emulsion at the drillsite and disposed of into injection wells also at the drillsite. Clean oil would be transported via a new 16-inch oil pipeline, connecting to the existing ConocoPhillips Sales Oil pipeline system near the Lompoc Oil and Gas Processing Facility and transported to refinery destinations out of the County. Produced gas would be transported to the Lompoc treatment facility via a new 6-inch gas pipeline parallel to the new oil line, Fig. 1.

The Point Pedernales Oilfield

As discussed in Volume I, based on subsurface geophysical mapping and other geological indicators, the Tranquillon Ridge resource area and the Point Pedernales oilfield are part of a same structure. The wells in the Point Pedernales side produce from the Monterey Formation. The geology of Monterey Formation and the importance of faulting and fracturing were discussed in details in Volume I. With access to more than 20 years of performance history on the Point Pedernales operations, we have made interesting observations about the behavior of the individual wells, their interactions, their drainage volumes and active reservoir drive mechanisms controlling ultimate recoveries.

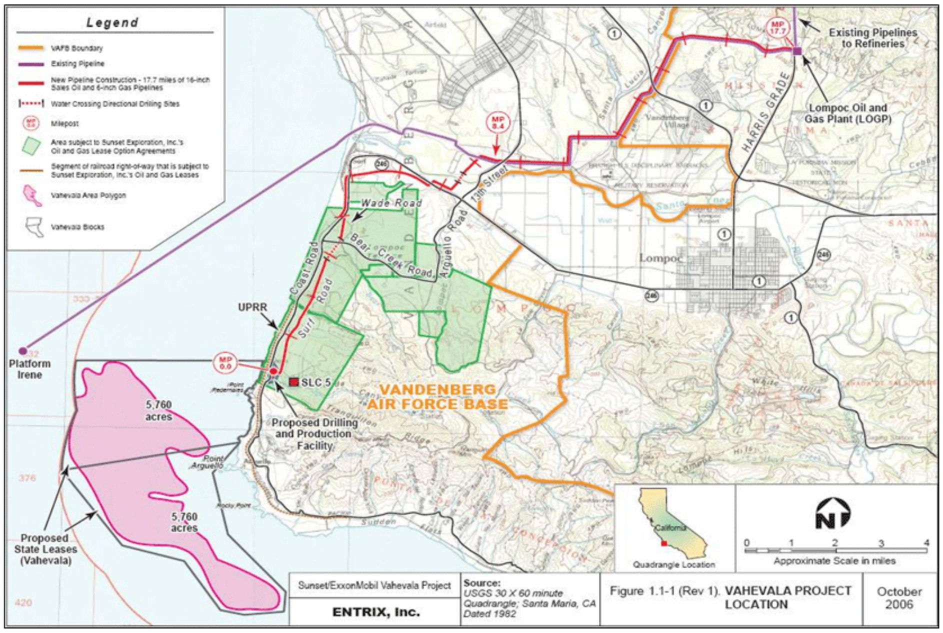

Fig. 1: Proposed drilling and production facility for the Vahevala Project (Source Santa Barbara County Energy Division Web Site).

Data Sources

The same data sources and reports used and consulted in the preparation of Volume I were used for the preparation of this report with the exception of additional independent seismic interpretation and other information specifically from the Vahevala proposal.

Work Processes

The following is a summary of the work processes for developing an engineering opinion about the posed questions:

1-We developed integrated performance maps of wells which have been producing from the Point Pedernales side of the structure. We developed diagnostic representation of well performance data in the Point Pedernales field and normalized those to a common basis to detect indications and extent of compartmentalization and pressure depletion.

2-We further generated 2-Dimensional cross sections and 3-Dimensional representations assessing the position of existing wells and faulting patterns and in combination with well log data examined the causes of high and low productivity in producing Point Pedernales wells. We developed exhibits integrating 3D and 2D seismic with well orientations.

Specifically, we used the seismic data to map the Top Monterey formation using 2D and 3D seismic data integrated with subsurface well control. The principle objectives of the exercise were to:

A-produce an independent interpretation of data,

B-map faults that may have contributed to fracturing in the Monterey,

C- and assess possible seismic evidence to help explain differences between high-productivity and low-productivity wells in the field.

All seismic interpretation work on this project was done using Seismic MicroTechnology's Kingdom interpretation software, 64-bit version 8.2.

High-angle reverse and oblique-throw faults dominate the study area. These faults strike NW-SE on the Point Pedernales anticline and change to a more NNW-SSE direction approaching the Tranquillon Ridge area. Curvature was calculated using the Laplacian operator – a 2^{nd}-order partial differential operator applied to the Top Monterey depth surface. In this case the grid was generated from the sparsely (every other inline) picked horizon. Unsigned dip magnitude was also generated from the same grid. The curvature map and the dip map were used to illustrate the pattern of faulting explicitly picked in the interpretation.

3-We examined the drainage issue by production activities from the Point Pedernales operation.

4-We focused on the issue of drainage radius by producing wells.

5-We projected future production given the proposed Vahevala development plan.

Based on the above studies, we have developed various projections of the expected productivity from the proposed project. The focus of this Volume II of our Public Report is the impact of the Point Pedernales operation on the Tranquillon ridge side of the structure. We present our analysis in 4 sections:

In Section I we concentrate on well location and structural position and proximity to the fault as it may relate to their cumulative oil production. In Section II we examine the pressure history of wells using GOR and WOR as proxies for pressure. In Section III we address the subject of drainage radius. In Section IV we discuss the evidence relating to drainage of the Tranquillon Ridge side caused by production from the Point Pedernales oilfield.

Section I: Well Trajectories

Experience from other Monterey producing fields shows the importance of well placement with respect to areas containing the highest concentration of fractured rocks. Fig. 2 shows the structural continuity between the Point Pedernales oilfield and the Tranquillon Ridge side of structure.

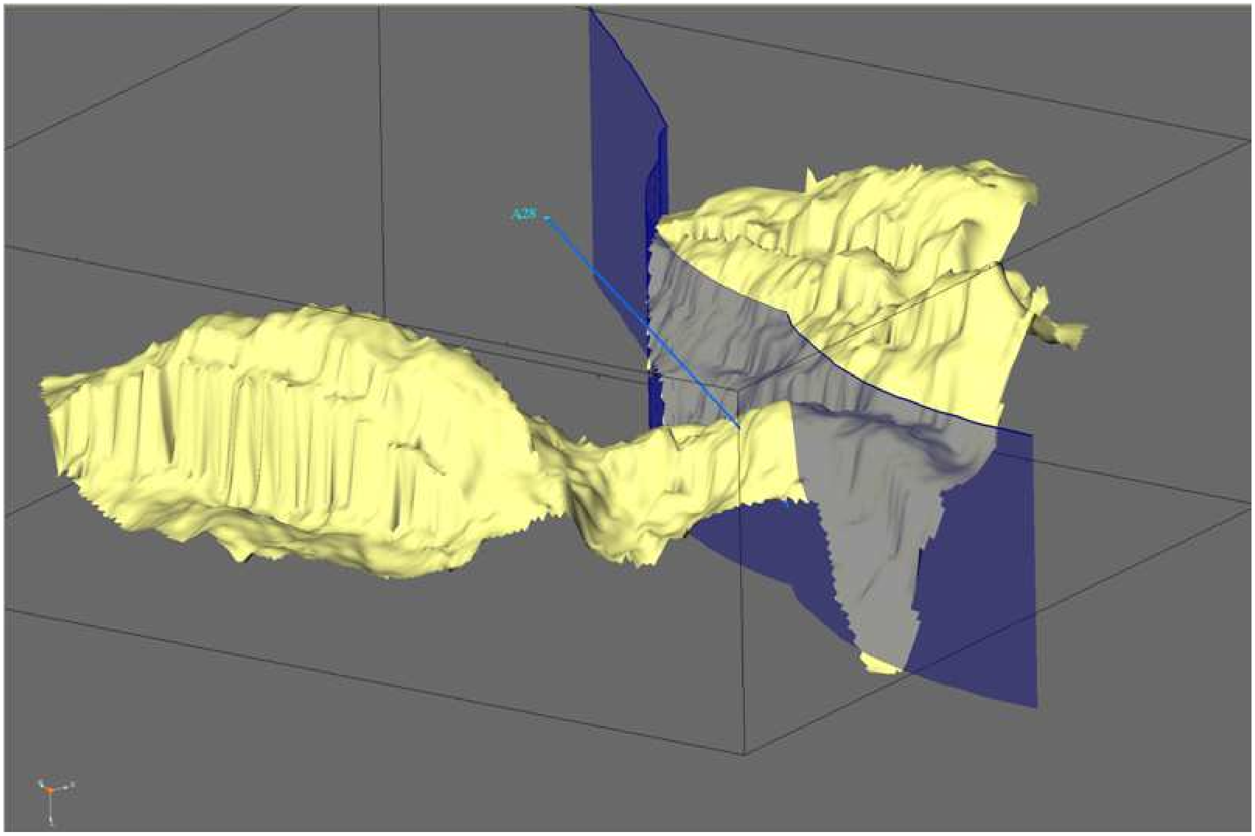

Fig. 2: Structural continuity of the Point Pedernales and the Tranquillon Ridge fields.

Fig. 3 shows the bottomhole location of the existing wells in the Point Pedernales field. The wells are directionally drilled and the well course and the bottomhole locations seem to have played an important role in the productivity of individual wells. As shown in Fig. 4, the cumulative oil production among the Point Pedernales wells has varied substantially from well to well. Wells such as A21 and A4 have produced in excess of 12 Million STB of oil. Other wells have produced less than 100,000 STB of oil.

In Fig. 5-7, we show the structural position of the high, intermediate and low cum oil wells. In these 3D renderings of the subsurface structure, we have removed the faulting to focus on structural control. Fracture susceptibility of the rocks surrounding the well and intensity of fracturing are important components to make wells highly productive. Given a high concentration of highly brittle siliceous rocks, structural position of bottomhole locations and structural curvature may affect the development of higher fracture densities and control well productivities.

As shown in Fig. 8, a series of NW-SE fault systems cut through the Point Pedernales Field. Examination of the mud logs and various 2D -3D mapping of faults and the well systems shows that the best wells are those with rock compositions high in quartz chert located in highly faulted and brecciated intervals. As evident from drilling of some very low producers, well performances indicate that the well trajectories and the placement of bottomhole locations were not originally not optimized to take advantage of the fault controlled fractured intervals.

In Fig 9, we show the concentration of the faults cutting through the structure and the proximity of high cum oil wells. To focus better, Fig. 10 shows the bottomhole location of high Cum oil well A4 in a fault block most likely surrounded by high fracture density.

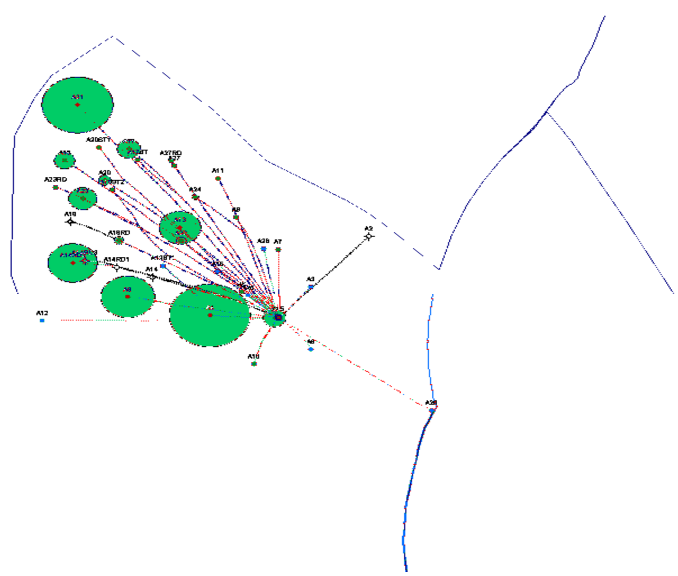

Fig. 3: Bottomhole location and projection of well courses in the Point Pedernales operation. Size of the bubbles relates to the per well cumulative oil production.

Fluid flow in the Monterey is heavily dependent on fractures and intersection of those fractures by the borehole. In fractured reservoirs it is not uncommon to observe a decrease in seismic reflectivity with increased micro-fracture intensity. Direct measurements of fracture intensity in the Monterey (e.g., FMI logs) are not available; therefore, well productivity is used as a surrogate for fracture intensity. Cumulative production of oil, gas, and water are tabulated. Boreholes are classified into three groups according to their BOE production: (1) high cum—greater than 7.5 million BOE, (2) intermediate cum—400,000 to 5.2 million BOE, and (3) low cum—less than 300,000 BOE.

	Well Name	Oil (bbl)	Gas (Mcf)	Gas BOE	BOE	Water (bbl)
High cum (>7.5 million BOE	A4	14,217,870	3,383,504	563,917	14,781,787	53,962,472
	A21	12,539,823	2,967,441	494,574	13,034,397	31,268,100
	A8	9,471,808	2,138,404	356,401	9,828,209	21,989,743
	A14RD2	8,721,819	3,413,691	568,949	9,290,768	51,347,263
	A13	7,434,999	1,614,920	269,153	7,704,152	14,659,469
Intermediate cum (0.4-5.2 million BOE)	A23	5,026,485	1,137,748	189,625	5,216,110	12,619,876
	A17	4,184,700	1,131,238	188,540	4,373,240	2,658,427
	A1	4,109,985	1,593,186	265,531	4,375,516	19,726,960
	A16	3,778,655	2,329,249	388,208	4,166,863	3,423,538
	A20	2,349,924	1,384,245	230,708	2,580,632	11,132,827
	A19	1,838,197	2,774,087	462,348	2,300,545	7,856,977
	A22	1,794,149	541,294	90,216	1,884,365	9,566,469
	A24	1,314,836	1,196,804	199,467	1,514,303	5,782,934
	A11	991,057	209,429	34,905	1,025,962	388,339
	A5	519,628	130,332	21,722	541,350	124,794
	A10	499,024	226,660	37,777	536,801	716,423
	A7	463,805	139,501	23,250	487,055	949,244
	A9	431,828	108,352	18,059	449,887	520,364
	A27	397,836	351,588	58,598	456,434	1,326,107
Low cum (<0.3 million BOE)	A25	218,652	355,588	59,265	277,917	1,668,831
	A28	201,657	443,547	73,925	275,582	10,106,286
	A18	140,038	37,616	6,269	146,307	479,953
	A3	137,248	32,874	5,479	142,727	122,475
	A12	120,058	108,807	18,135	138,193	10,044
	A6	73,362	26,055	4,343	77,705	157,929
	A26	13,930	35,145	5,858	19,788	164,565
	TOTAL	**80,991,373**	**27,811,305**	**4,635,218**	**85,626,591**	**262,730,409**

Fig. 4: Grouping of wells in the Point Pedernales operation based on their cumulative oil production.

3D perspective view of Top Monterey w/o faults

High-cum wells in red

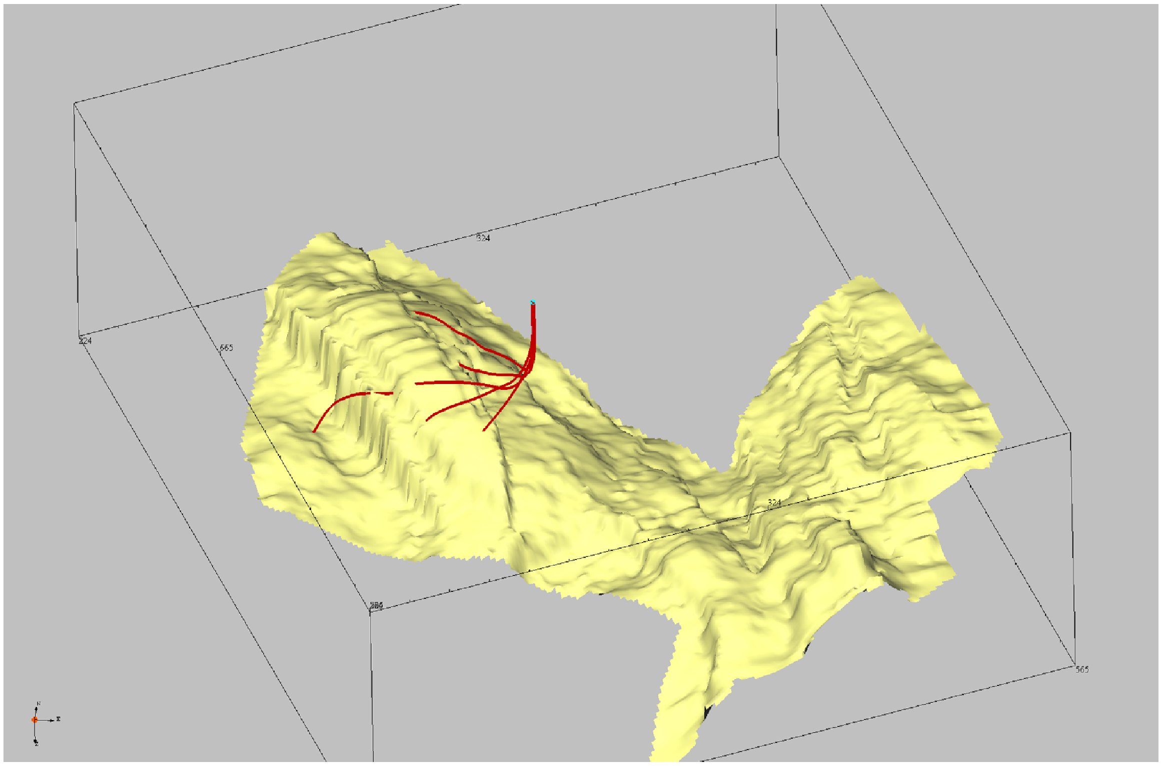

Fig. 5: Structural position of the wells with highest productivity. Well courses seem to be primarily perpendicular to the NW-SE direction.

3D perspective view of Top Monterey w/o faults

Low-cum wells in blue

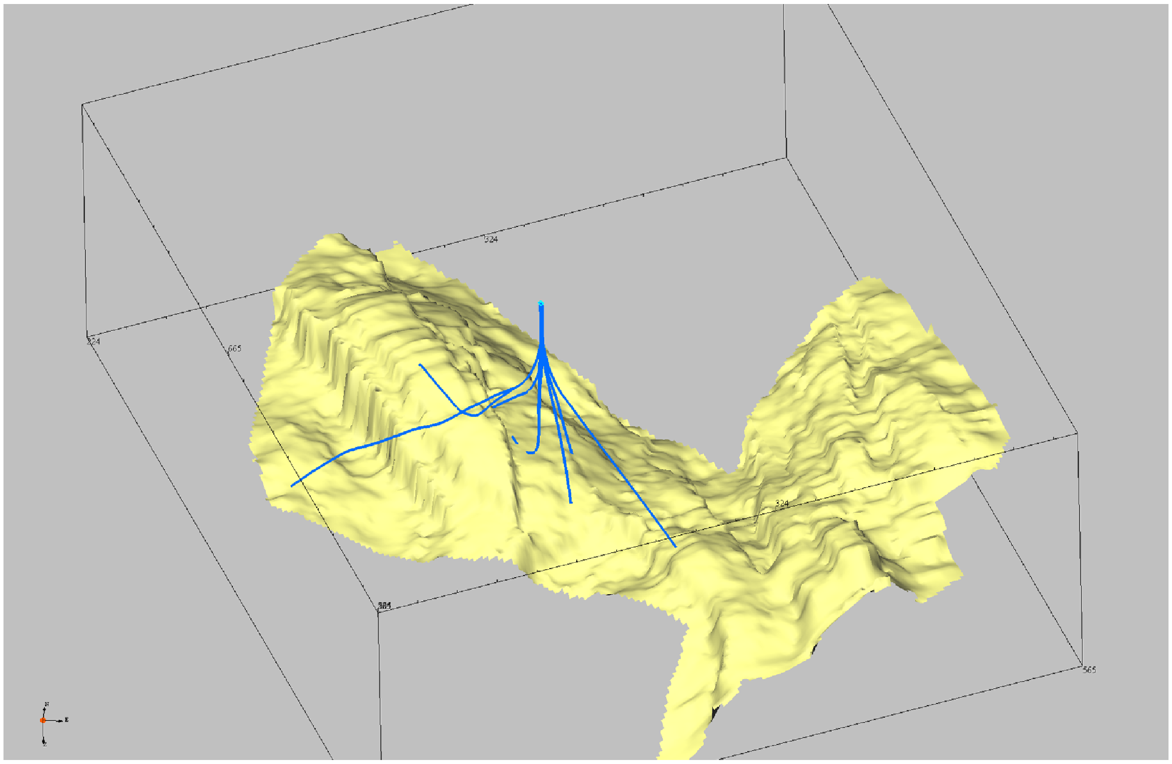

Fig. 6: Structural Position of low cum oil wells. Well courses are primarily parallel to the NW-SE direction.

3D perspective view of Top Monterey w/o faults

Intermediate-cum wells in green

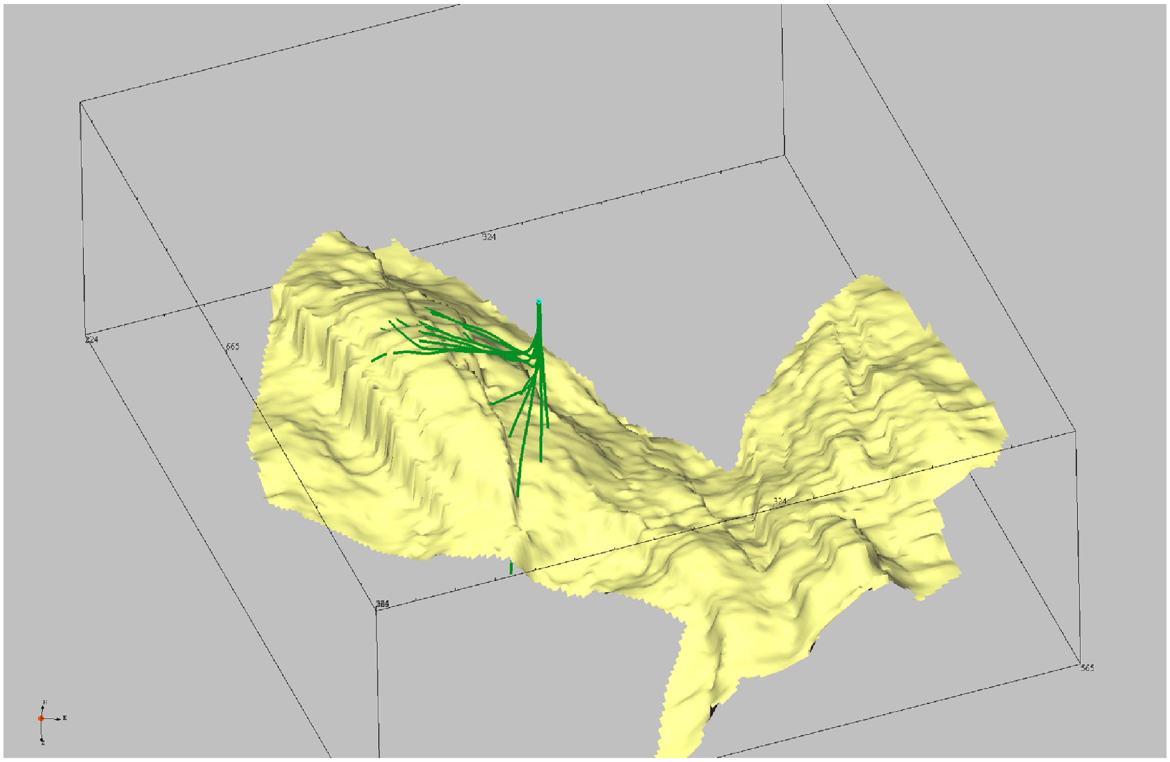

Fig. 7: Structural Position of intermediate cum oil wells. Well courses seem to be at angles less than 90 degrees to the NW-SE direction.

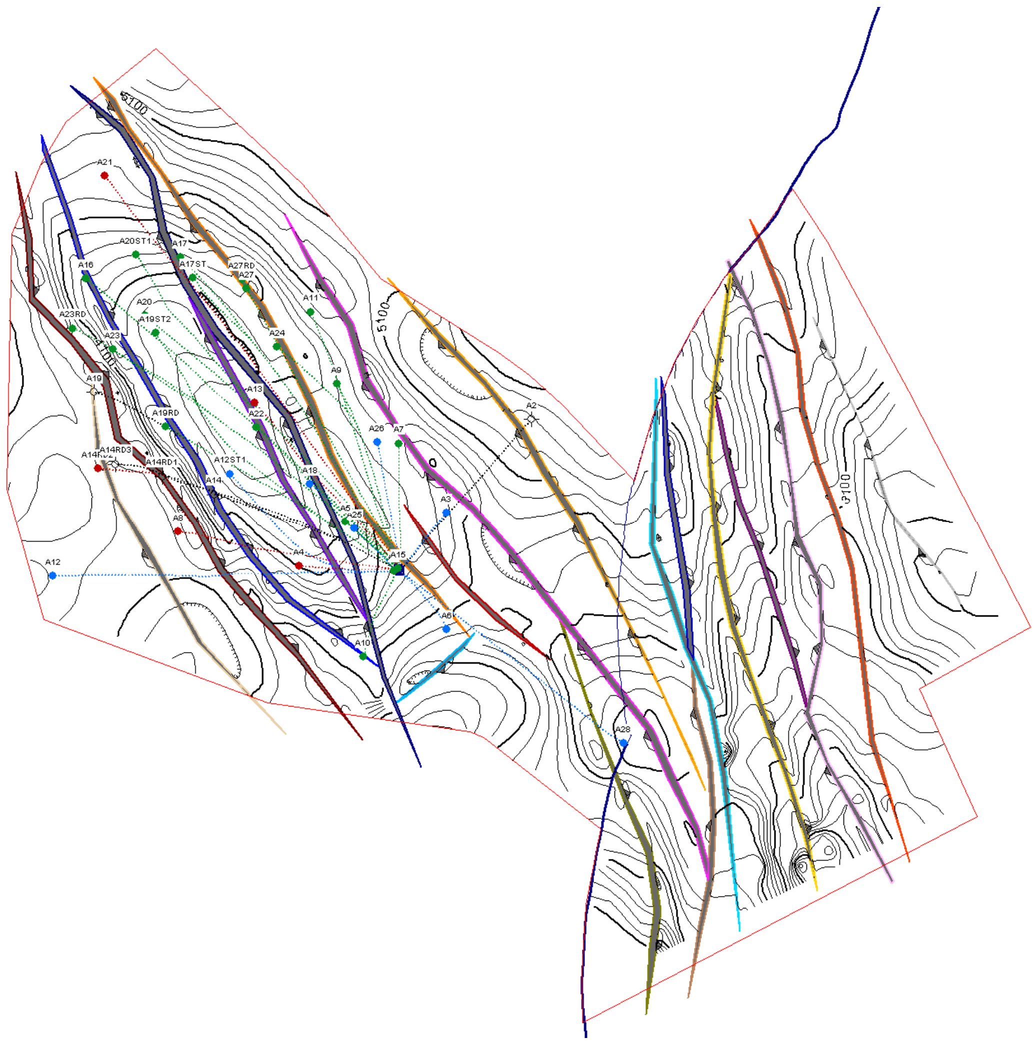

Fig. 8: The NW-SE directionality of the faults cutting through the Point Pedernales Oilfield.

3D perspective view to northwest showing high-cum boreholes in red.
Top Monterey in yellow; only fault planes near boreholes are displayed.
Depth range = -3000' to -6000'

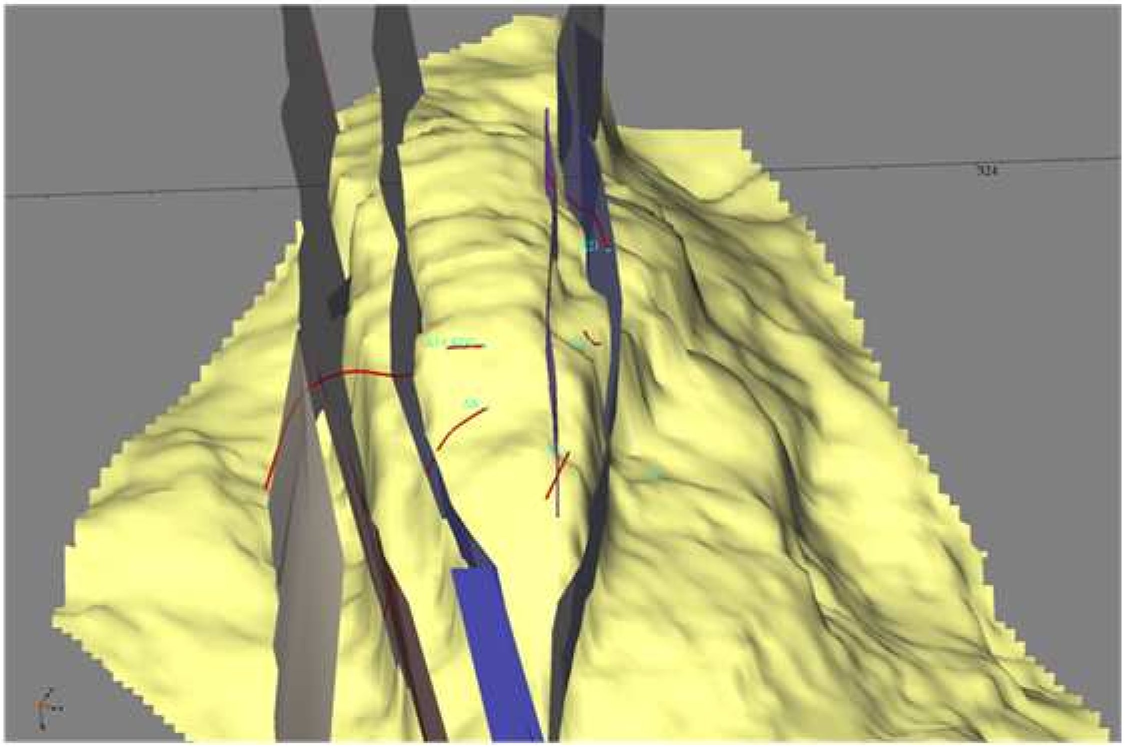

Fig. 9: High Cum Wells and Nearby Faults.

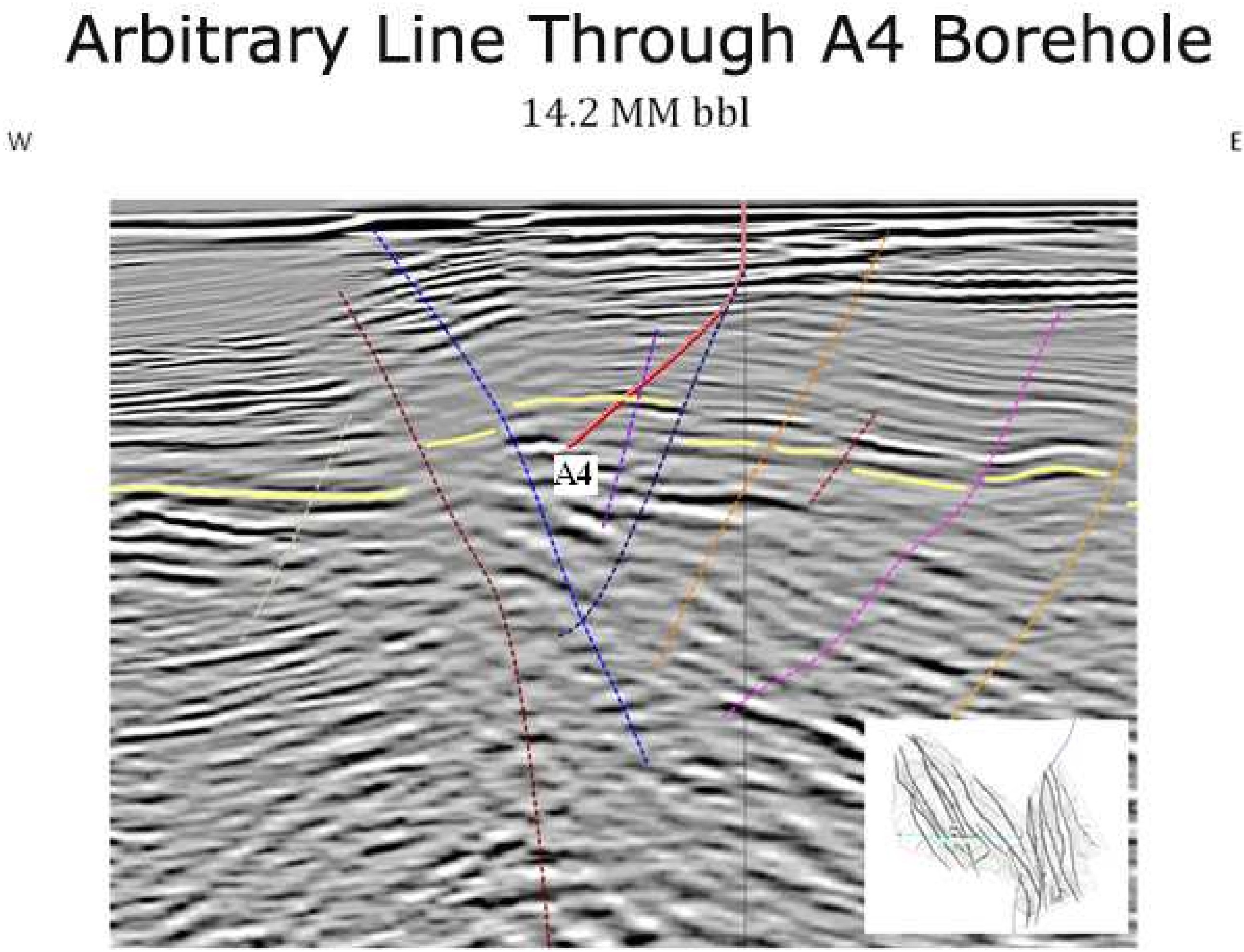

Fig. 10: Fault Block location of A4 open interval.

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Section II: Pressure Mapping

To model the drainage radius of producing wells, one needs pressure and pressure interference data. Such data are not available on individual wells. To examine the drainage radius, for wells producing from the fractured controlled Monterey Formations, we can look at two proxies for pressure data. First is the producing gas oil ratio indirectly reflecting pressure levels and the second is the water oil ratio highlighting the pressure support of the natural water drive caused by expansion of the aquifer.

Type curve analyses of some prolific producing wells clearly show the support of the aquifer and later breakthrough of water. Type curve analyses were focused on various segments to demonstrate periods governed by pressure depletion and water influx. Support of aquifer can be seen from the constant producing GOR close to the solution GOR extending for a long time and eventually exhibiting the bubble point pressure resulting in a jump in the producing GOR.

For the type of the crude oil produced from the Point Pedernales operation, the solution gas oil ratio at its bubble point has been observed to be about 250 standard cubic feet of gas per one stock tank barrel, (SCF/STB). As long as natural water drive energy from the expansion of aquifer beneath the oil column is maintaining the pressure; i.e., voidage=replacement, the observed GOR's are expected to be about 250 SCF/STB. As soon as the natural water drive support becomes insufficient or water flow is hindered to maintain the pressure, the crude oil begins to release its dissolved gas and one observes a rise in the producing gas oil ratio.

Figs. 11-13 show three typical gas oil ratio plots. One is for well A21 that for a long time has maintained a producing gas oil ratio close to its minimum. In contrast we see well A4, the best well in the field that has shown the rise in GOR after producing more than 11,000,000. STB of oil. Contrast that with Well A28 that shows high GOR from the start of its production. As was discussed in Volume I, we attribute the presence of high GOR from inception for well A28 to a prior depletion of that section of the structure.

In Fig. 14, we show an aerial distribution of producing GOR behavior for all the wells. A glance at all the graphs shows areas where GOR has definitely exceeded the solution GOR levels and one can assume these areas have experienced pressure losses. To put this in a better light, we show the same observation on a normalized cumulative production basis. In Fig. 15, the same GOR plots are shown except all cumulative oil productions have been normalized to a maximum scale of 18 Million STB. Wells such as A4 and A21 can be seen for their distinct type curves maintaining high cum production volumes before their GOR shows a sign of local pressure losses. But for some wells, such as A28, A12 and A10 we see high GORs at the beginning with trivial volumes of cumulative production. The normalized plot demonstrates the significant variation of hydrocarbon volumes available to individual wells within their drainage volumes. Such a contrast across the field points out the presence of compartments of various capacities.

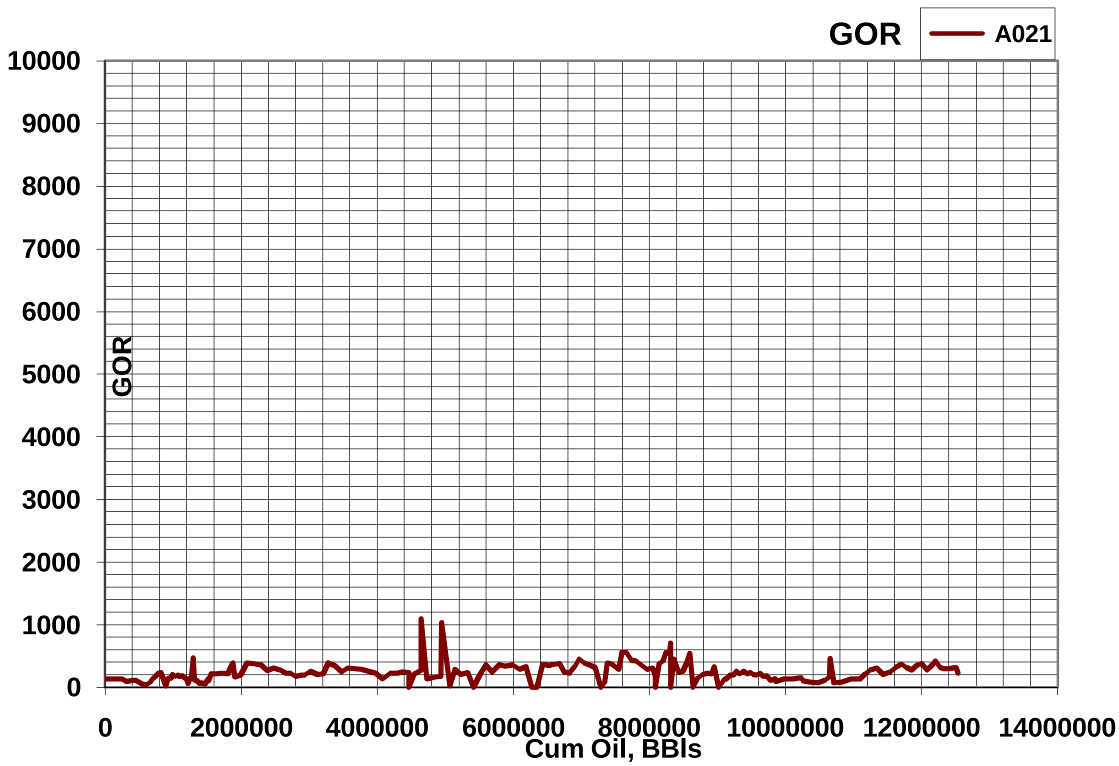

Fig. 11: Pressure support observed in well A21 as indicated by a long period of low producing GOR.

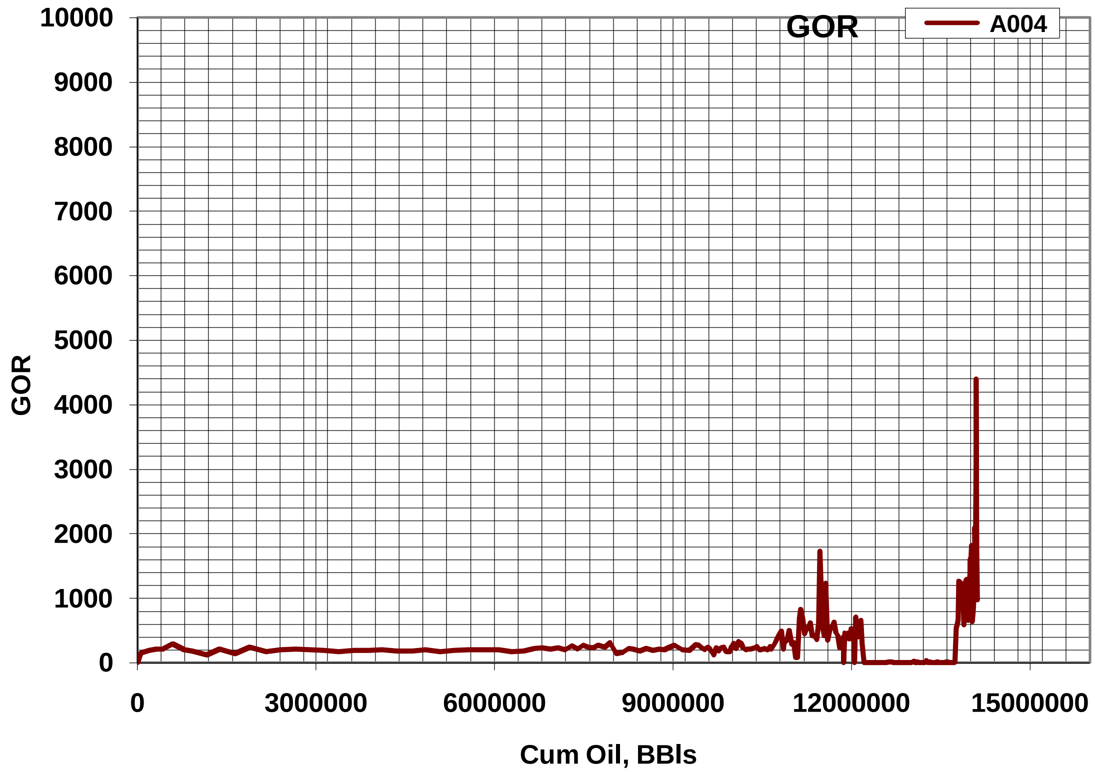

Fig. 12: Evidence of aquifer support for A004 from low GOR's all the way to a cumulative production of more than 11 million barrels.

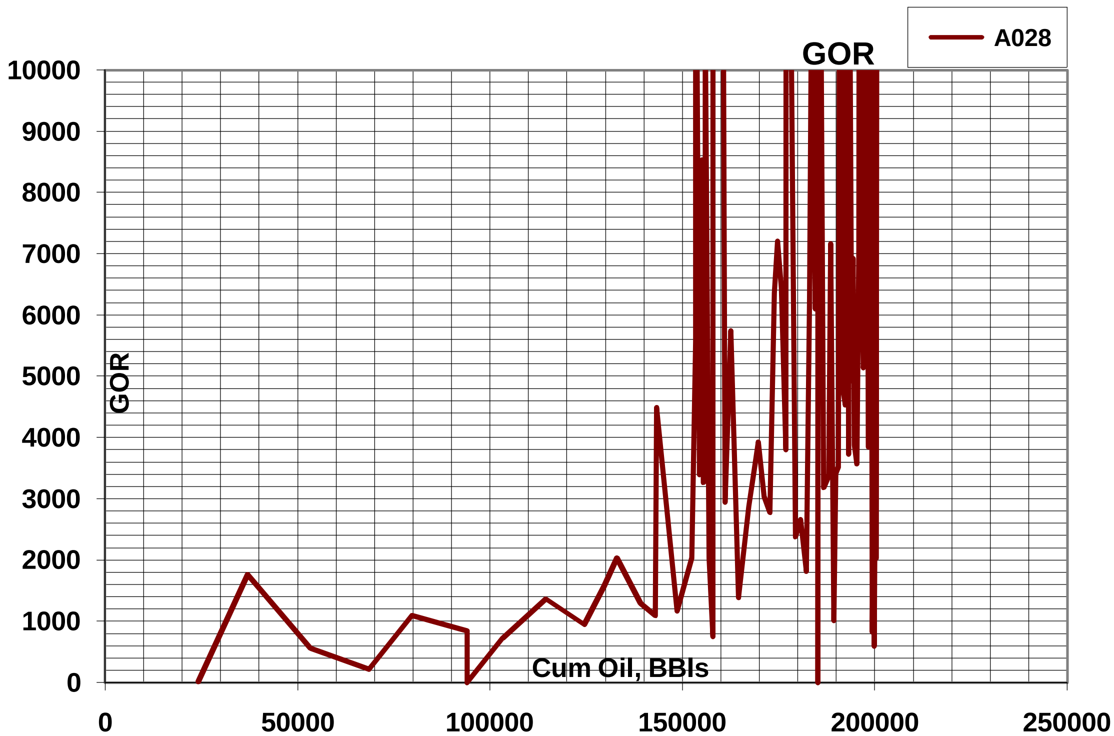

Fig. 13: GOR behavior of Well A28 showing evidence of reservoir pressure drop from the start.

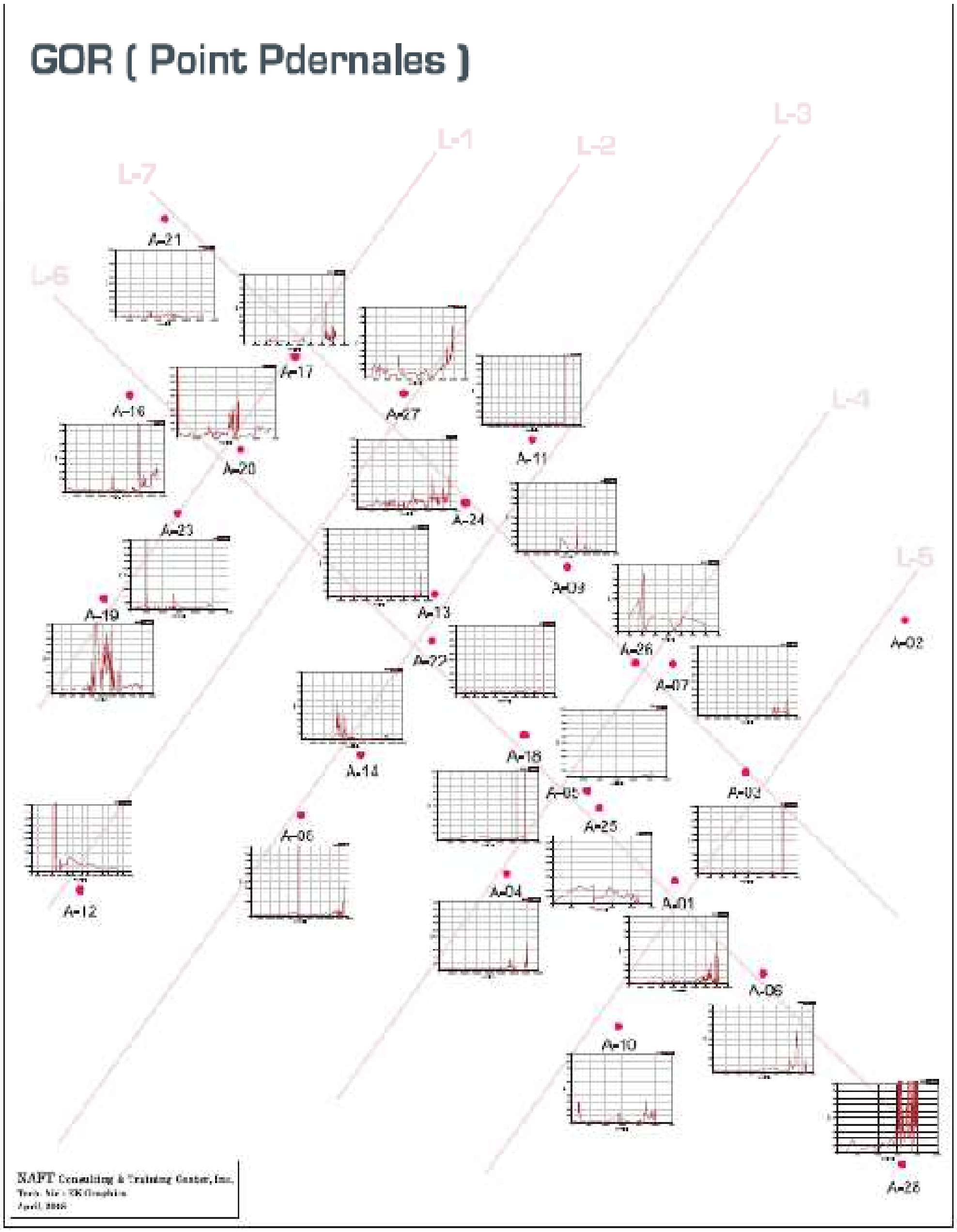

Fig 14: Areal distribution of GOR-Cum behavior of the Point Pedernales wells.

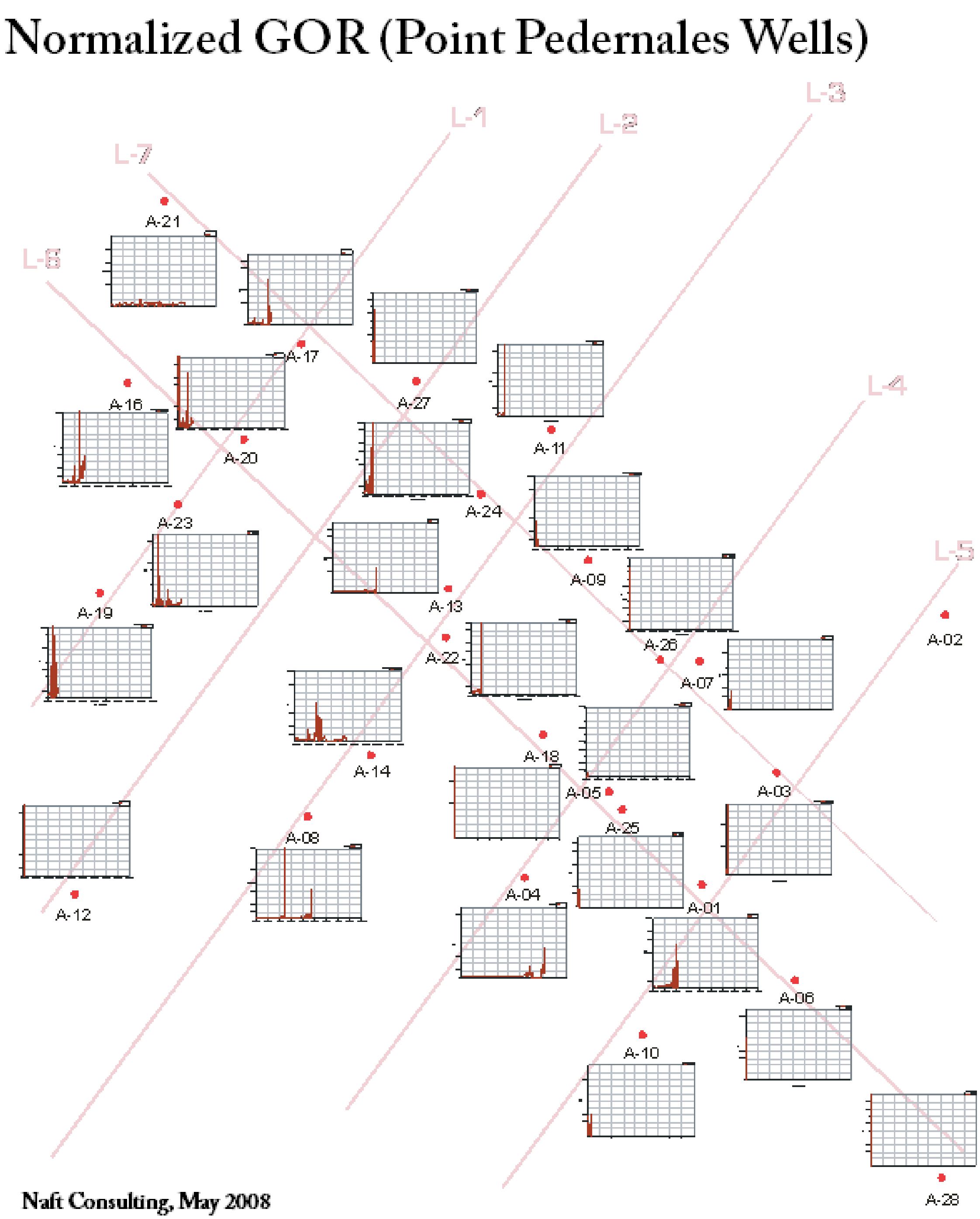

Fig 15: Areal distribution of GOR-Cum Behavior of the Point Pedernales Wells under normalized (0-18,000,000 Bbls Cum scale) conditions.

For several wells, one observes a rapid rise in GOR early on without well having produced much. This includes wells such as A28, A10 and A12. Looking at Fig. 14, one notes the wells exhibiting the highest CUM GOR include A07, A05, A19, A27 and A24. Interestingly, all these wells started at pressures above bubble point and continued for a while before free gas caused a jump in the producing GOR. All these wells started at low WOR's except A027. From its WOR behavior, the presence of a wet interval is seen from the onset of production. This clearly indicates the interaction of the aquifer with wells and the importance of optimizing completion practices to take advantage of aquifer support rather than channeling water into the producing wells.

Now we examine the WOR behavior of individual wells. Typical diagnostic plots of WOR vs. CUM in most cases show the behavior similar to a water flood. In this case the source of water is the aquifer expansion. Exceptions are those wells that show high water production from the beginning because of poor completion.

WOR-Cum diagnostic plots for three wells A4, A21 and A28 are shown in Fig. 16-18. Behavior observed is that of water driven production system where the aquifer supplied water is causing natural water drive. For such systems, as it commonly known, the WOR vs. CUM oil follows an exponential rise as depicted by a straight line on a semi log plot.

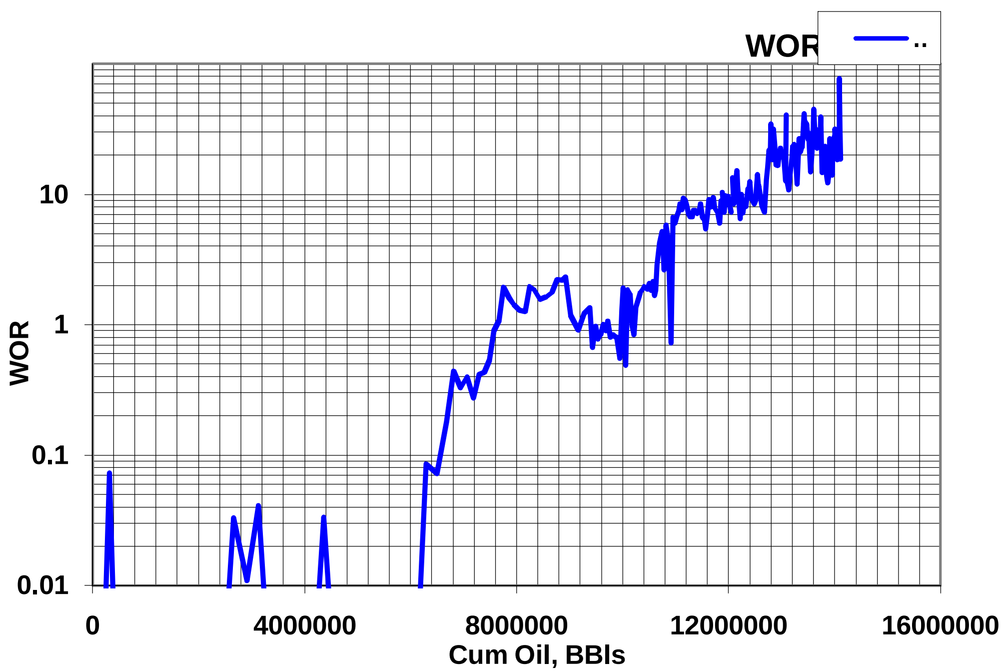

Fig. 16: Example of water free production followed by natural water drive for Well A004.

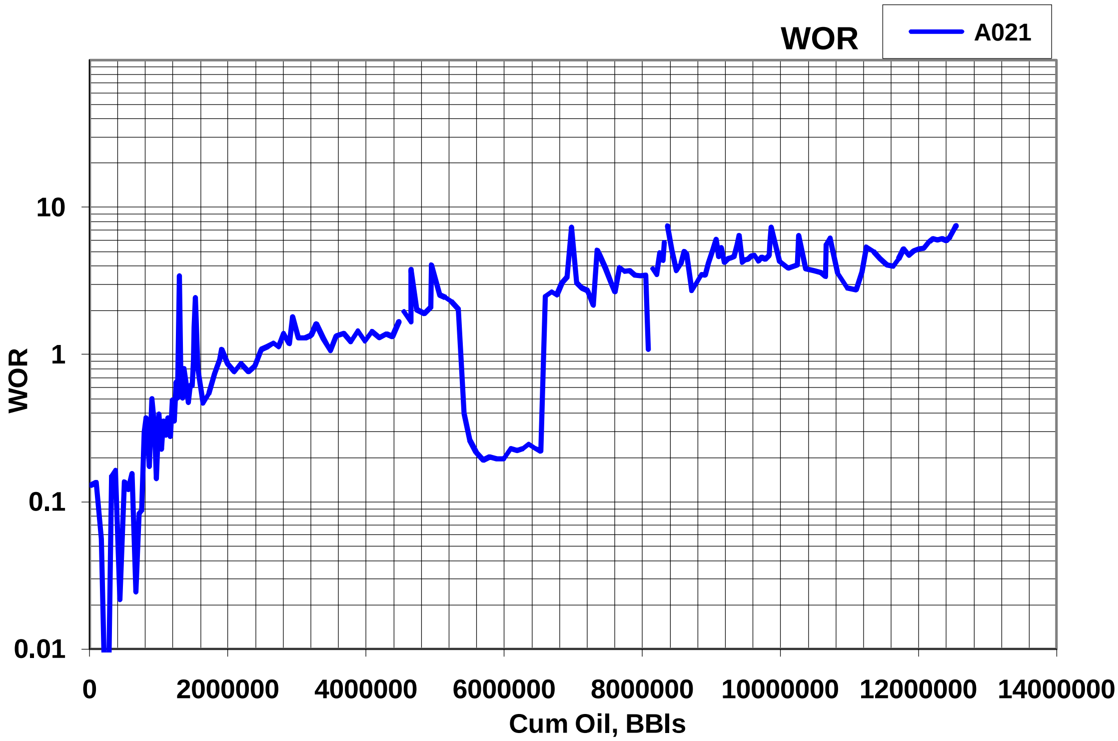

Fig. 17: Another example of water free followed by natural water Drive for Well A21.

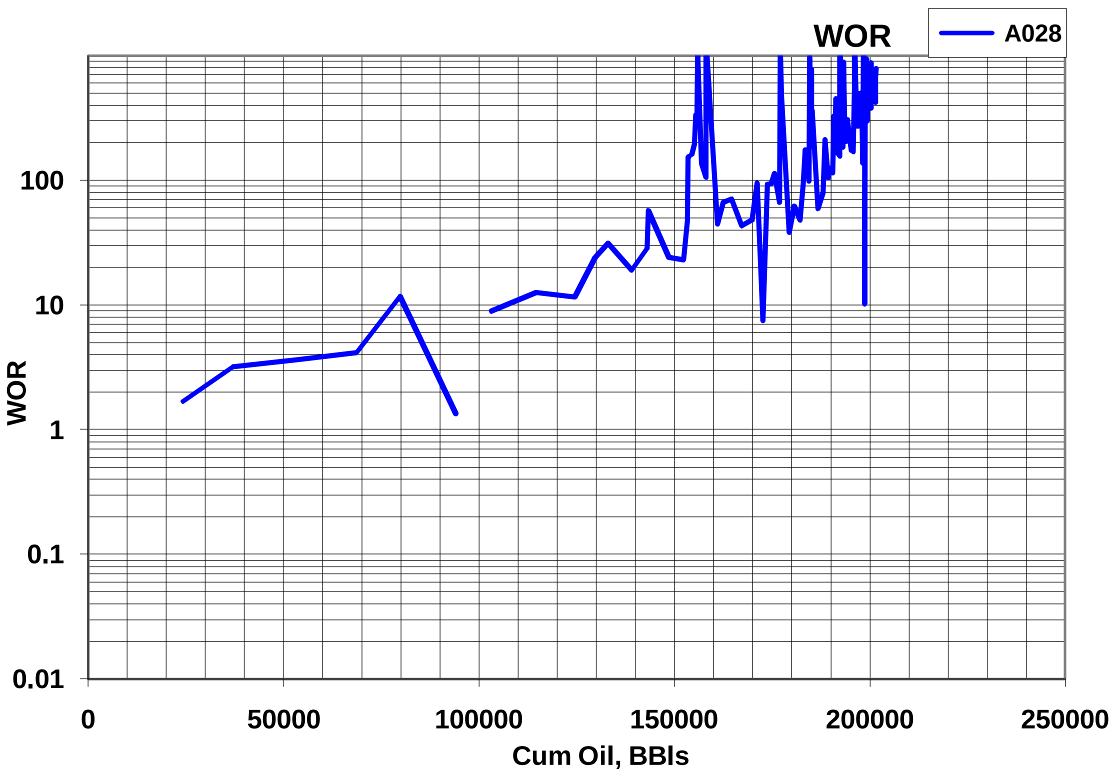

Fig 18: Example of water coning for Well A28.

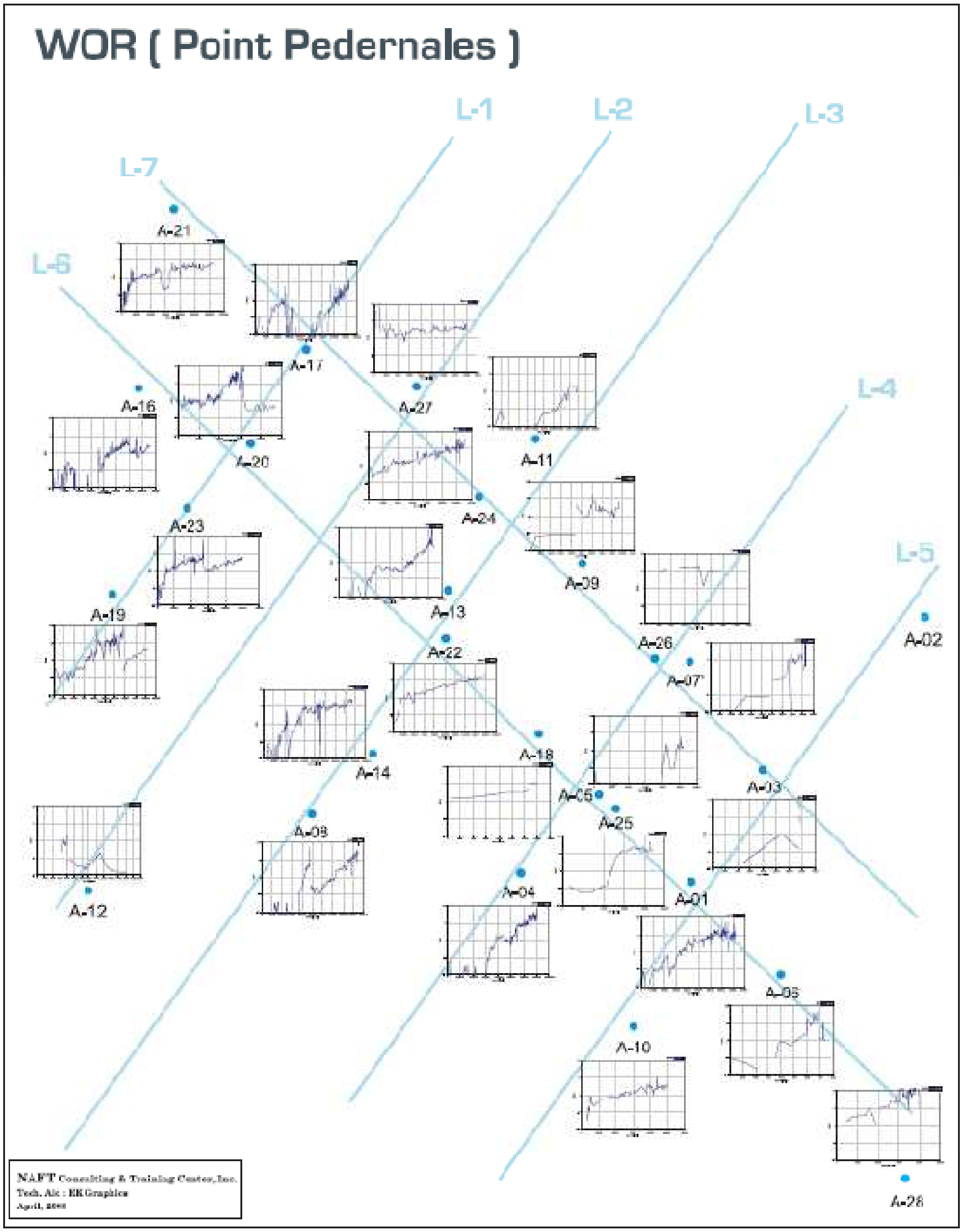

Fig. 19: Depiction of natural water-drive behavior on WOR-CUM plots.

Normalized WOR (Point Pedernales Wells)

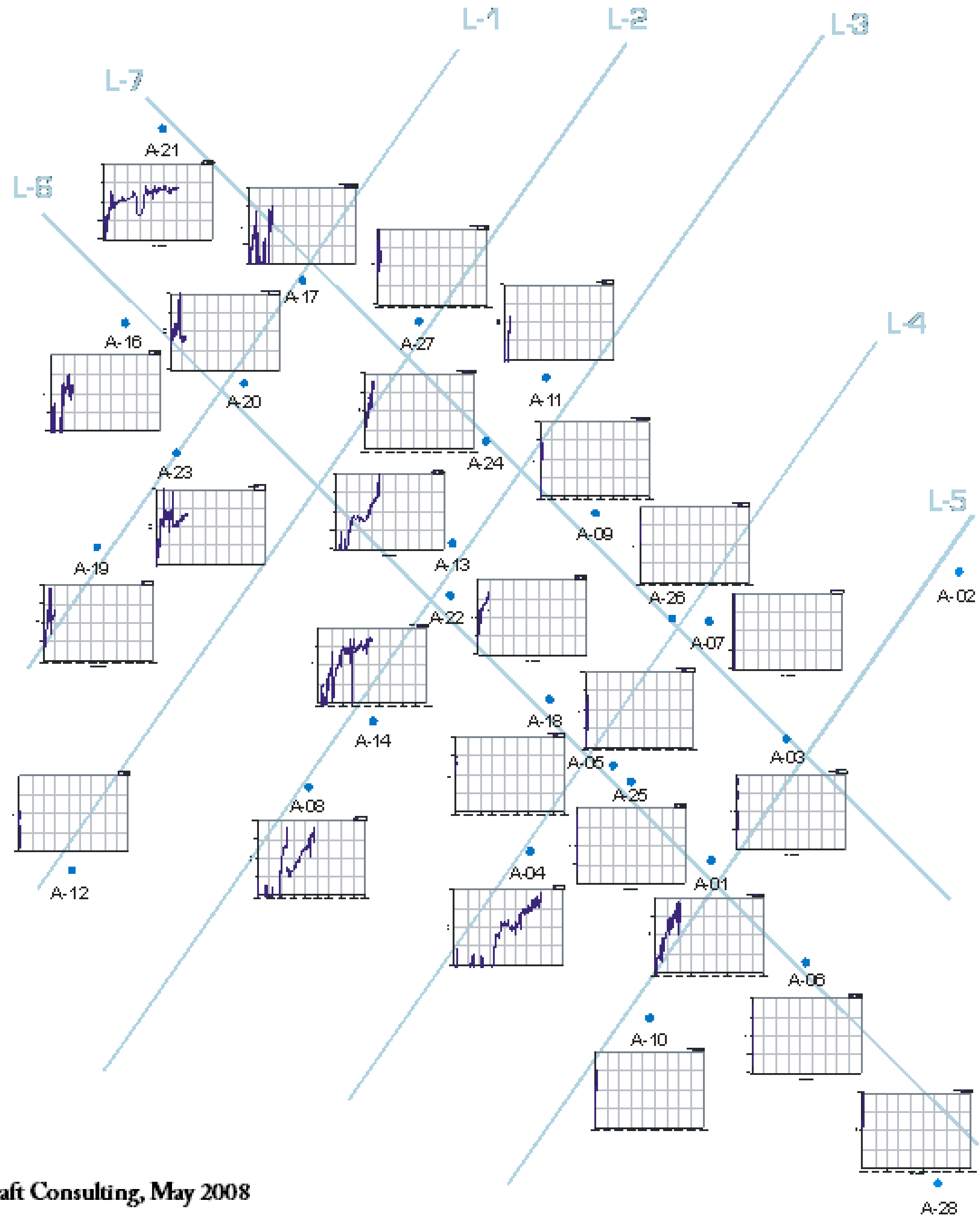

Fig. 20: Areal Distribution of WOR-Cum behavior of the point Pedernales Wells on a normalized CUM Oil production scale.

Poor wells are easily identified as those exhibiting high WOR's without any significant cum oil production.

On Rate vs. time or vs. cum oil one observes a period of stabilized rate followed by a fracture controlled decline and a transition when lower permeability storage contributes to flow, Fig. 21. The stabilized period supported by active aquifer ends with water breakthrough, and if the rate of aquifer support is below the voidage rate, pressures drops cause an increase in producing GOR.

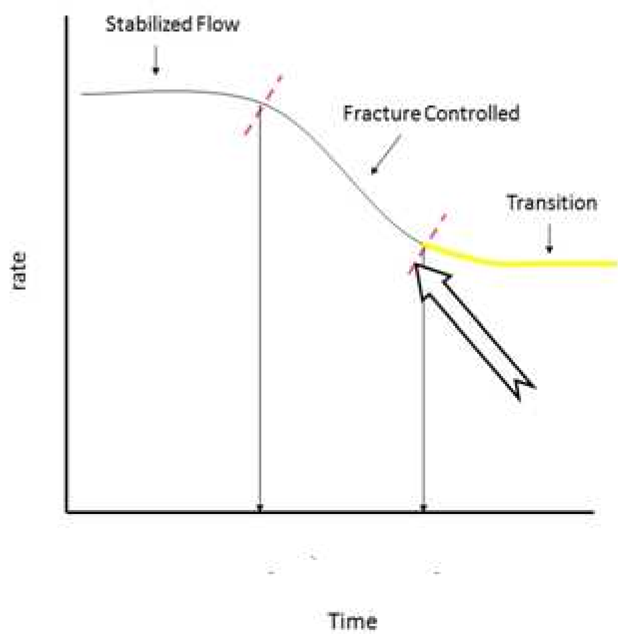

Fig. 21: Type curve of production behavior from typical prolific wells.

Fig. 22-23 show the areal type curves for the production plots observed on various wells. On the normalized scale the poor wells are masked by their low cum oils and good wells are clearly identified.

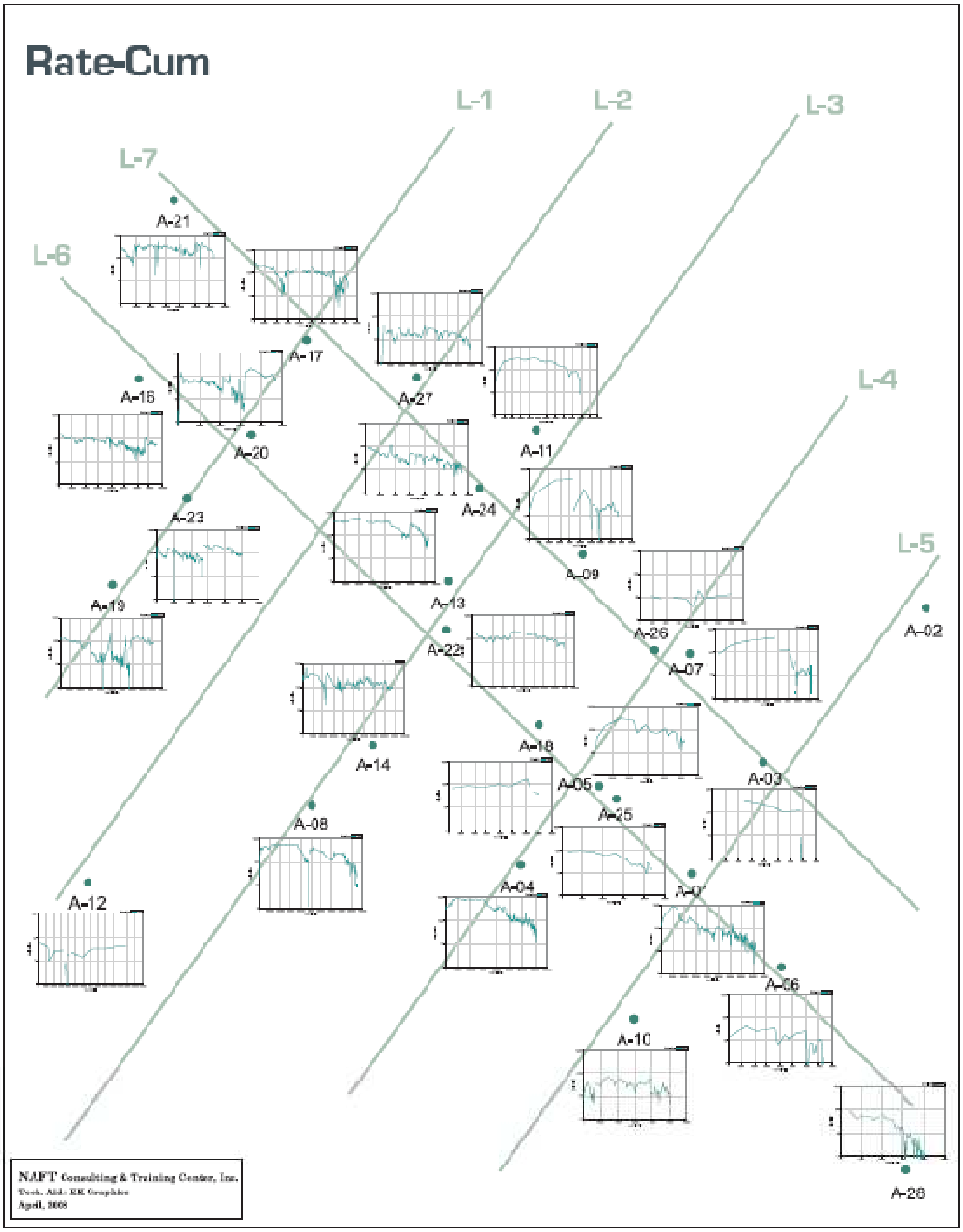

Fig. 22: Areal Distribution of Rate-Cum Behavior of the point Pedernales Wells. Note the stabilized levels for various wells.

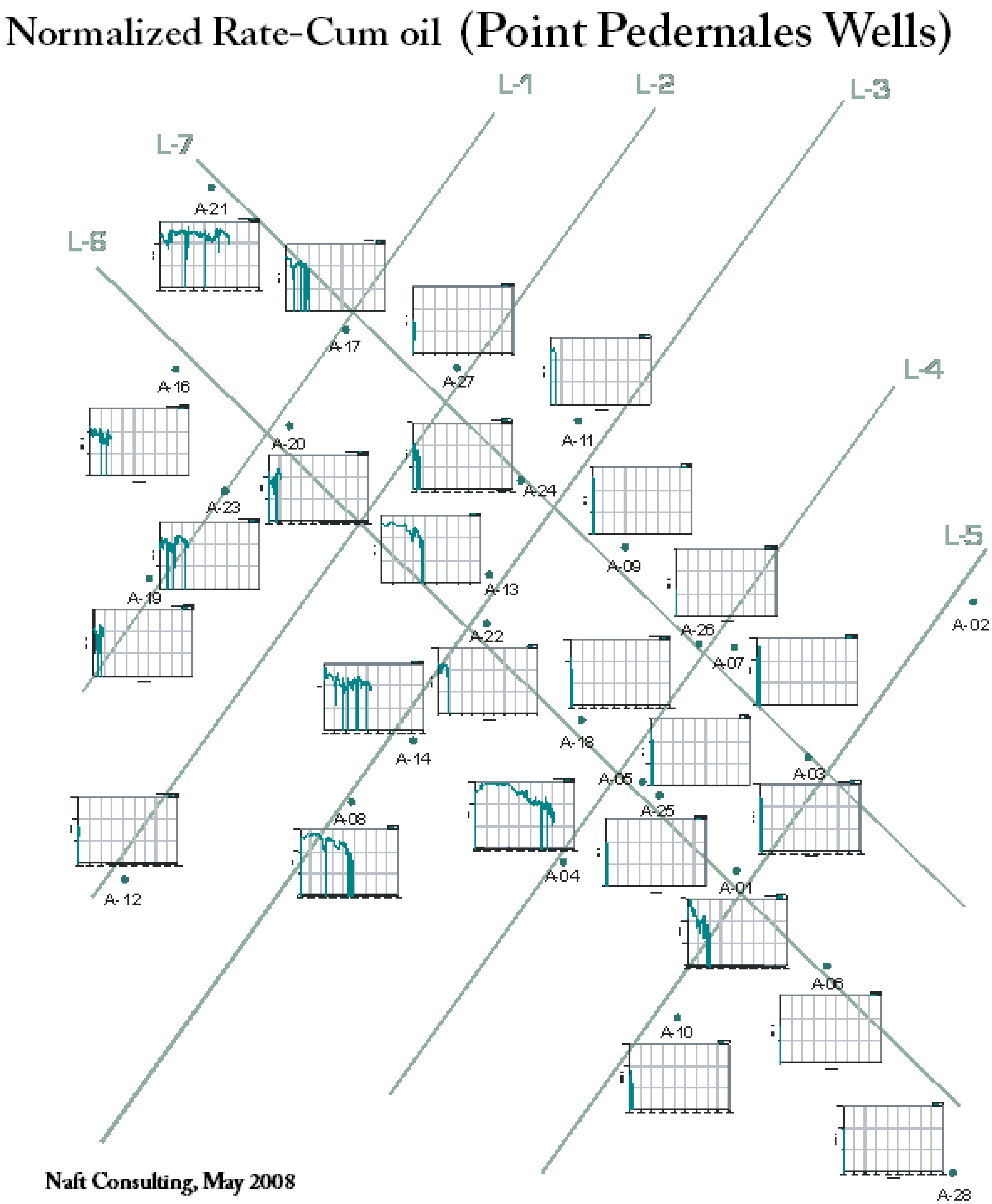

Fig. 23: Areal Distribution of Rate-Cum oil Behavior of the point Pedernales Wells similar to Fig. 22 except the cum oil axis is normalized to 0-18,000,000 bbls. On the normalized scale, note long periods of stabilized rates for A04, A21, and A13.

Section III Drainage radius

Drainage radius for a well draining a radial system can be expressed as:

$$R_d = \sqrt{\frac{CUM\ Voidage * 5.615}{\pi h \varphi (1 - S_{wi} - S_{or})}}$$

Because of inherent uncertainties about $h\varphi(1 - S_{wi} - S_{or})$, strict application of the equation is not practical. We used the concept of defining Rd relative to the Rd after 1 hour of flow. With the opening of the well during the first hour, the pressure transients spread throughout the drainage area and a large volume may be investigated. But the CUM Gross after one hour is so small that, from the materials balance point of view, one can assume a finite radius contributing to the flow. In this report we use an arbitrary radius of 1 ft representing the first hour flow.

$$R_d / R_{d(1\ hour)} = \sqrt{\frac{CUM\ Voidage}{Cum\ Voidage\ after\ 1\ hour\ flow}}$$

Fig. 24-29 show some typical plots of estimated drainage radius for various wells. In these calculations we are only using surface cum gross production as a measure of voidage. As such the actual drainage radius for each well is potentially higher than the values computed. In some cases such as well A21, there seems to be an expanding drainage area which will result in more future production. Well A04, while enjoying a 700 ft drainage radius shows the signs of boundaries. For wells such as A28, the drainage radius is around 300 ft.

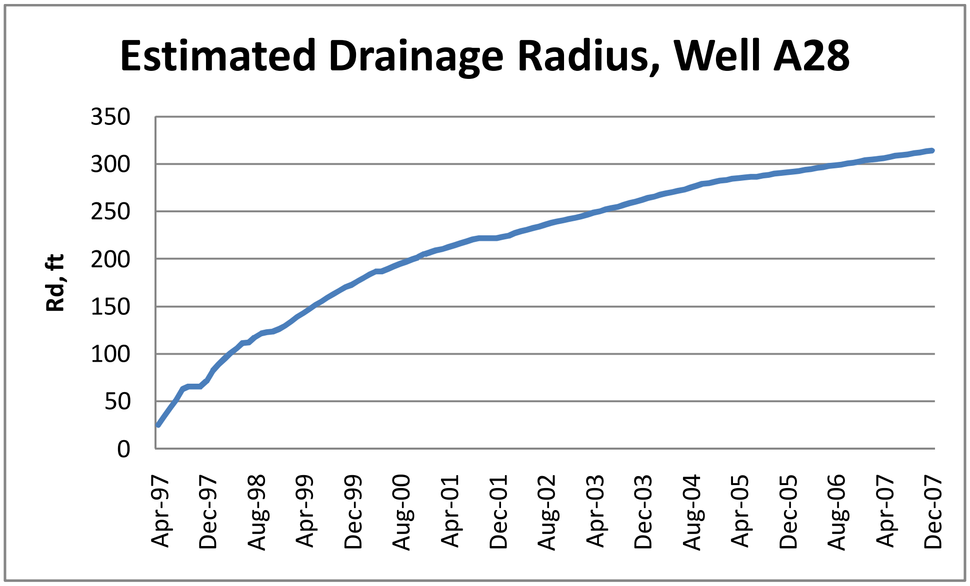

Fig. 24:Estimated equivalent drainage radius for Well A28.

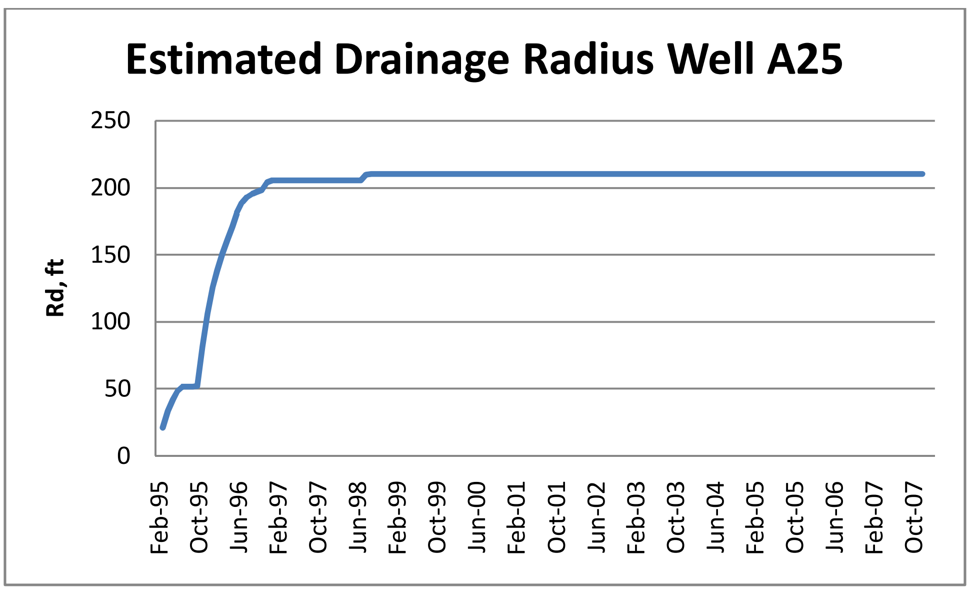

Fig. 25: Estimated equivalent drainage radius for Well A25.

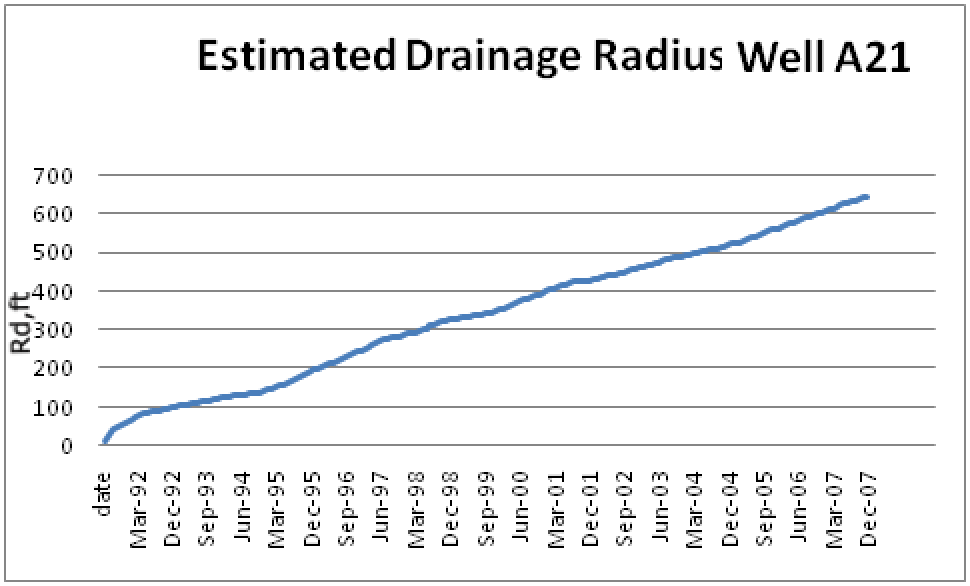

Fig. 26: Estimated equivalent drainage radius for Well A21.

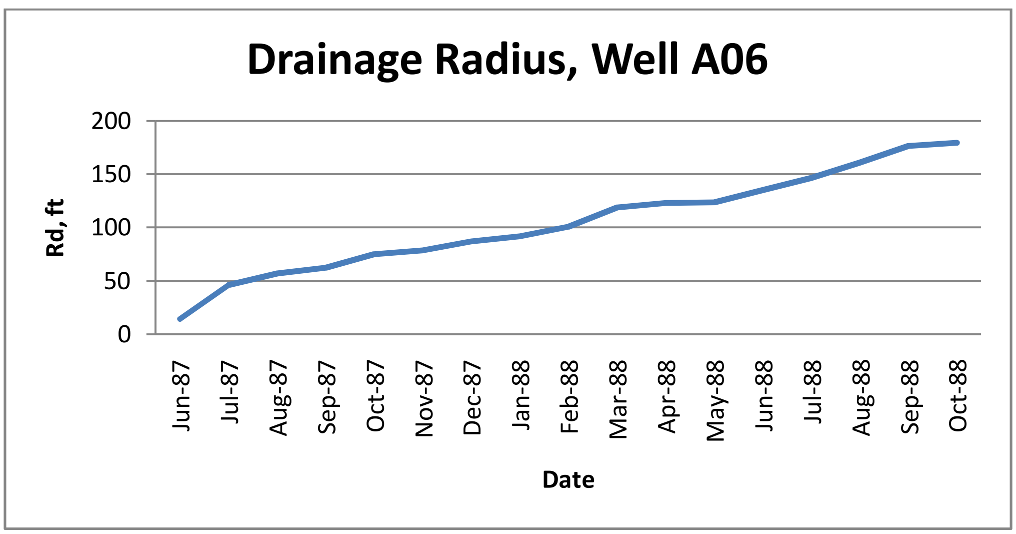

Fig. 27: Estimate equivalent drainage radius for Well A06.

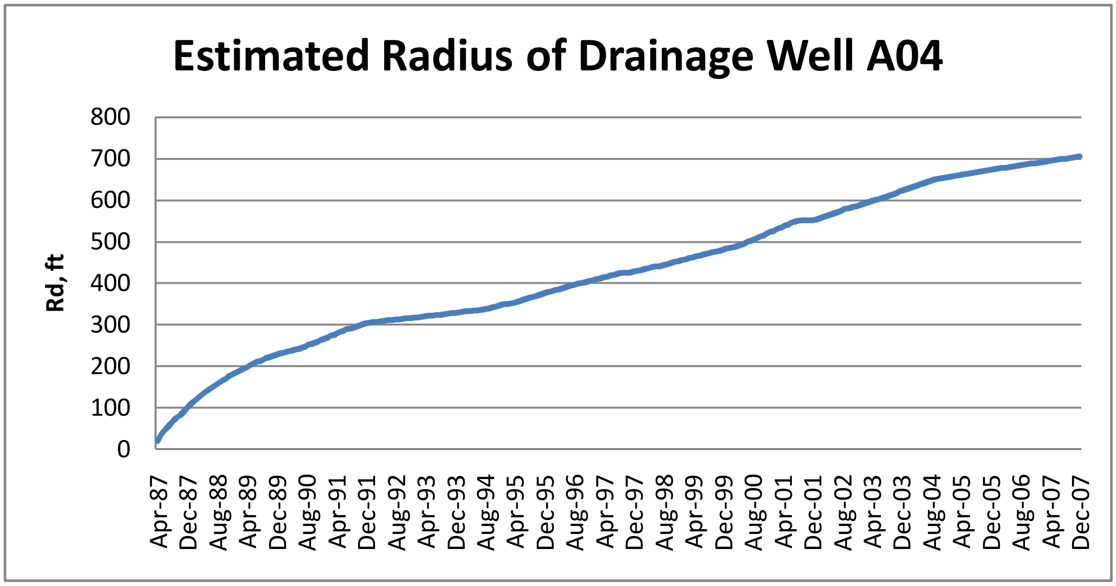

Fig. 28: Estimate equivalent drainage radius for Well A04.

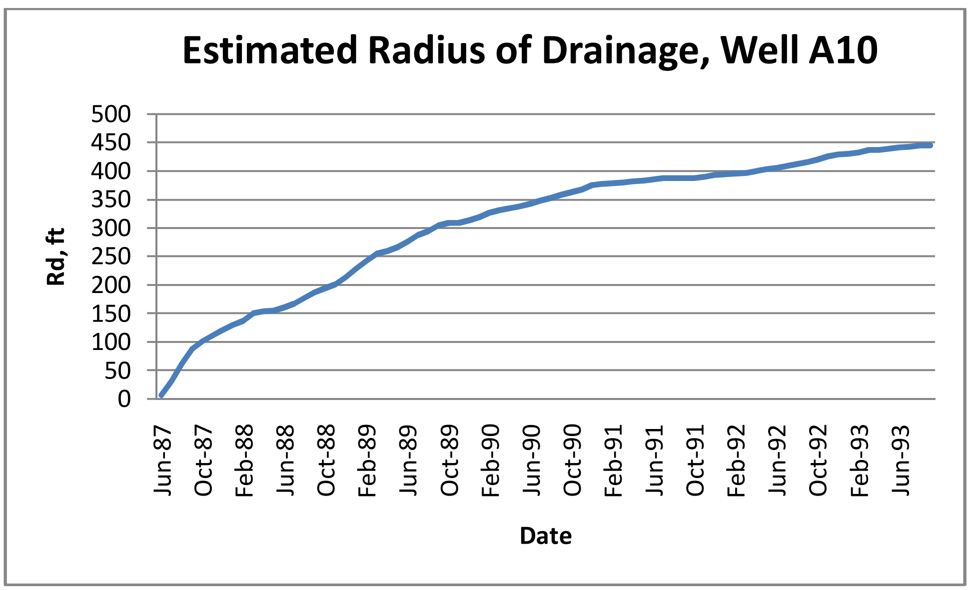

Fig. 29: Estimate equivalent drainage radius for Well A10.

Section 4: Drainage of the Tranquillon Ridge side by the Point Pedernales operation

Point Pedernales has produced excessive water as reflected in the plot of its CUM water oil ratio with Cum oil, Fig. 30.

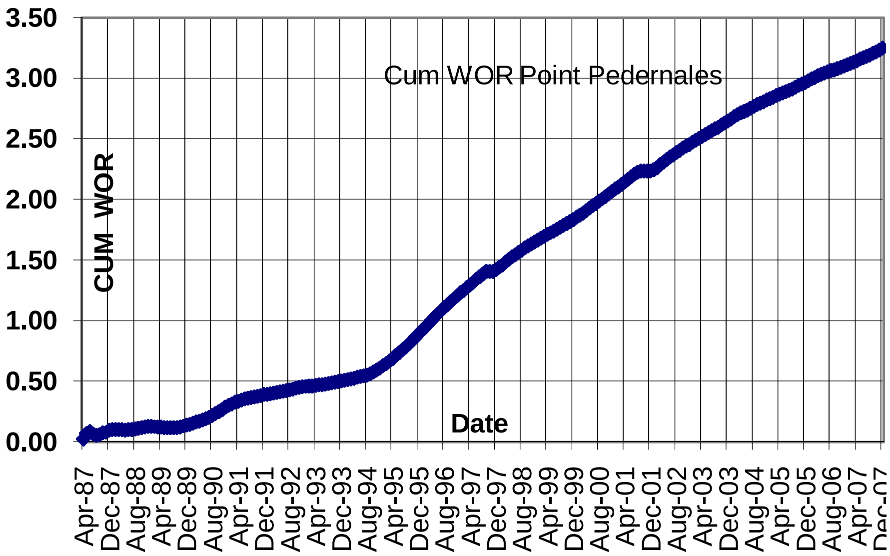

Fig.30 Rise of CUM WOR for the Point Pedernales Field representing increasing waste of aquifer energy

Table 1 shows average cumulative water oil ratios over the span of 15-25 years life for fields producing from Monterey reservoirs. These numbers on a cumulative basis represent total produced water for a unit of oil volume produced. They range from 0.41 to 1.37.

Table 1: CUM Production and Ratios for Monterey Producing Analogs

Field	Cum Oil. STB	Cum Gas, MSCF	Cum Water, BBls	CUM GOR	CUM WOR
Sacate	24348144	15218212	10003114	625	0.41
Hondo	263093892	576181257	129449550	2190	0.49
Pescado	117360846	162960003	62835148	1389	0.54
Pt Arg	174843969	135245692	239216312	774	1.37
Pt Ped	80991373	27811305	262730409	343	3.24

Point Pedernales shows an exceptionally high CUM WOR of 3.24. Similar to pressure maintenance by waterfloods, fluid replacement from natural aquifer expansion should be equal to the voidage caused by production, to maintain reservoir pressure. As shown in Table 1, all other Monterey producing fields indicate pressure decline from their CUM GOR. In comparison, Point Pedernales wells show that, while some portions of the reservoir have low pressures, in general the fieldwide CUM GOR is low indicating aquifer support.

If the Tranquillon Ridge side were to behave like other Monterey fields, one would expect a CUM WOR of 1.37 or lower. Here we use Point Arguello as the closest Monterey field. Based on the estimated recoverable oil from this analog, the Tranquillon Ridge side with no interference from Point Pedernales operation, after achieving its expected maximum recovery of 150 Million STB, would produce 1.37*150= 241 million bbls of water. By contrast, Point Pedernales by producing 81 million barrels of oil and 262 Million barrels of water has produced (262-1.37*81) =151 million barrels of excess water.

This corresponds to a loss of aquifer drive energy that could have provided the energy to support the production of almost 110 million barrels of oil. As shown in Fig.30. conditions are continuing to worsen as evidenced by the rise in cum WOR in Point Pedernales. Even if the CUM WOR stays at 3.24, as shown in the calculation in Table 2, continuation of production from the Point Pedernales operation can cause natural aquifer energy losses and associated oil recovery losses of about 260,000 Bbls per month from the Tranquillon Ridge side of the structure.

Table 2: Estimation of Monthly Oil Recovery Losses with Continuation of Production in Point Pedernales Field.

Month	Monthly oil, STB	Cum Oil, STB	Cum wor	Cum water, bbls	Expected Cum Water, bbls	Cum Excess Water Produced	water influx losses, bbls	losses in Recovery, STB
		80991373	3.24	262730409	110958181	151772228	299214	218404
1	200000	81191373	3.24	263303623	111232181	152071442	372732	272067
2	199002	81390375	3.24	263948988	111504814	152444173	370873	270710
3	198010	81588385	3.24	264591134	111776088	152815046	369023	269360
4	197022	81785408	3.24	265230078	112046009	153184069	367182	268016
5	196040	81981448	3.24	265865835	112314583	153551251	365351	266680
6	195062	82176510	3.24	266498421	112581818	153916602	363529	265350
7	194089	82370599	3.24	267127852	112847720	154280131	361716	264026
8	193121	82563720	3.24	267754143	113112296	154641847	359912	262709
9	192158	82755878	3.24	268377311	113375552	155001759	358117	261399
10	191199	82947077	3.24	268997371	113637496	155359875	356331	260095

Summary and Conclusions

To build upon the observations discussed in Volume I, a summary of important points is listed here:

1-Interpretation of the data concludes that there are no discontinuities between The Point Pedernales field and the undrilled Tranquillon Ridge side of the structure located under the State waters.

2-At the start of A28 production, there was strong evidence of free gas suggesting prior depletion and drainage of gas, natural gas liquids and reservoir energy from the Tranquillon Ridge side.

3- The aquifer supporting wells in the Point Pedernales field and the Saddle is of a chemical composition distinct from sea water making it a closed aquifer system and based on other production data a continually depleting aquifer by the operations in the Point Pedernales area.

4- Under the Sunset/ExxonMobil development proposal, where 30 wells are planned to produce within a 30 year operational life, we expect the recoverable oil to range from 170-180 Million STB plus the associated natural gas and natural gas liquids. Ultimate recoveries can be higher by the virtue of more oil in place.

As discussed in Volume I Public Report of this study, there is some evidence, such as the thickness observed in ARCO 444-01, south and east of Platform Irene that the thickness of Monterey is greater in the Tranquillon side than that observed on the Pedernales side. For the Monterey Formation, it is a combination of formation thickness and fracture density that contributes to high ultimate recoveries. For the Tranquillon Ridge side, this depends on whether the structure was active during Monterey deposition. Assuming the thicker Monterey section and fracture quality is verified by initial delineation wells, recovery per well can be higher than the mean values. But that can only be verified by reservoir assessment followed by the drilling of the initial delineation wells. The ultimate recovery also depends on the long term recovery losses caused by drainage of natural water drive energy and other non physical factors such as the economics, number of wells drilled and life of the operations.

We now present the public summary for the second part of the study in a format that responds to the tasks posed under objectives of the study:

Task 1: Use modern techniques for the calculation of drainage of those wells in the Point Pedernales Field close to the State/Federal boundary.

We developed a procedure for estimation of dynamic growth of an equivalent radius of drainage emphasizing the role of water production. The fractured nature of the rocks contributing to well productivity precludes the use of typical radial flow type curves. Experiments with these type curves shows the deviation caused by aquifer support but does not lend itself to estimation of drainage radius. As such an equivalent radius of drainage is estimated by monitoring the CUM gross production from individual wells. What is important is the volumetric drainage that can extend vertically to support the productivity of individual wells.

For well close to the State-Fed boundary, we have estimated the following:

Well Maximum Drainage radius from the well (as of Dec. 2007)

A28	310 ft
A06	170 ft
A10	450 ft
A25	210 ft
A04	700 ft

Task 2: Determine the dynamics of the radius of drainage or the time/production-dependency of the drainage radius of some of the wells in the Point Pedernales Field.

In addition to the solution gas drive, aquifer pressure is the main source of primary reservoir energy. The drainage volume of individual wells is a function of the available energy and can change with interferences from other wells draining water pressures. Figures 25-29 show the dynamic changes in the estimated equivalent drainage radius.

Task 3: Determine if drainage of oil and gas from State lands is occurring by virtue of production from the Point Pedernales Field.

The voidage generated by the production of oil, water and gas from Point Pedernales side is replaced by the expansive energy of the aquifer water. Excessive amounts of water produced from the Point Pedernales operation has established that the aquifer under Point Pedernales side is the downstream of the common aquifer. This has resulted in potential hydrodynamic movement of aquifer energy and affecting ultimate recoveries of any future development of the Tranquillon Ridge side of the structure.

As indicated in Volume I Public report, annually more than 27000 MSCF of gas and 1240 bbls of associated natural gas liquids per year are drained by Well A28 alone. Interpretation of continued production from the Point Pedernales field concludes that depressurization of substantial natural water drive energy is occurring causing the waste of State resources in Tranquillon Ridge side of the structure and migration of gas and associated liquid hydrocarbons. Our calculation shows that at the current rate of production in the Point Pedernales Field, an equivalent of more than 260,000 bbls of ultimate oil recovery per month would be at risk. That means, continuation of the Point Pedernales operation during the next several years can cause the drainage oil and gas and associated reservoir energy affecting the ultimate recovery of the Tranquillon side by about 3 million barrels of oil per year.

Task 4: Identify other potential drainage mechanisms due to the Pt. Pedernales Field production if applicable.

No other mechanism of drainage can be articulated based on available performance data.

Task 5: Analyze performance history with additional information if applicable and update potential reserves of the entire Tranquillon Ridge State resource area proposed to be developed using analogue of other Monterey production in the area.

In Volume I we estimated that maximum recoveries for the Tranquillon Ridge would not exceed 170-180 million barrels. But we discounted the estimates based on the concerns about the shallow depth of the structure affecting rock quality and fracture density and also potential losses of reservoir drive energy. We suggested an ultimate primary recovery not to exceed 150 million barrels. Drilling from onshore, may however provide a more optimal orientation of the drilling path. This would allow better exploitation of fractured intervals associated with the directionality of the NNW-SSE fault zones. As such it is possible that ultimate primary recoveries of this project to be on the high side (150 million barrels) of the range estimated below.

As discussed in Volume I Public Report of this study, there is some evidence that the Monterey section is thicker on the Tranquillon ridge side. As discussed in that report, there is also uncertainty about the timing of the Monterey deposition and the active structure building. That can affect the composition, thickness and fracturing quality of the rock in the area. If the thicker section on the Tranquillon side also corresponds to good fracture quality and there were no losses of oil, gas, and water because of drainage caused by fluid production on the Point Pedernales side, ultimate recoveries can be higher by the virtue of more oil in place. In the analog fields there have been wells exceeding the mean values estimated above but also a great number of wells have been poor producers with ultimate recoveries of less than 1 million barrels. It is only through the initial delineation wells that information about Monterey thickness, fracture quality and pressure depletion can be analyzed to develop more realistic estimates of ultimate recoveries.

Task 6: Based on the applicant's proposed development plan, and using an analogue of other Monterey producers in the area, develop an estimated production forecast.

Our projection of recoverable reserves for the Vahevala project is shown in Fig.31-32. We have based it on ultimate recoveries per wells averaging 3 to 5 million barrels of oil. This results in ultimate primary recoveries ranging from 100 to 150 million barrels of oil and the associated gas and natural gas liquids.

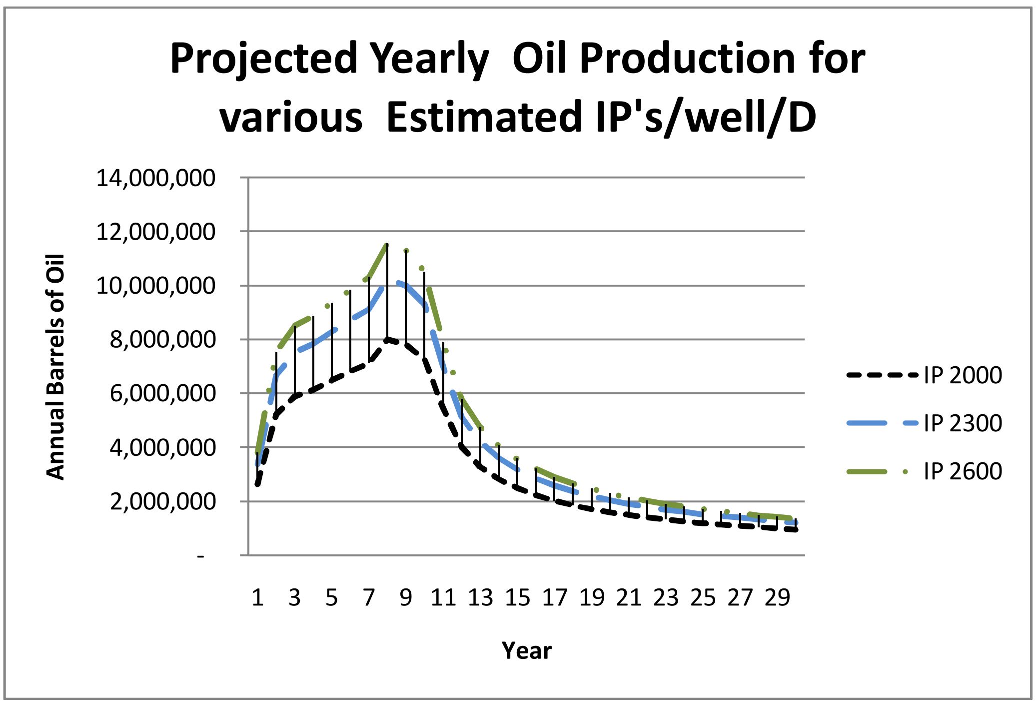

Fig. 31 : Projection of the Range of Annual Production for the Sunset Vahevala Project.

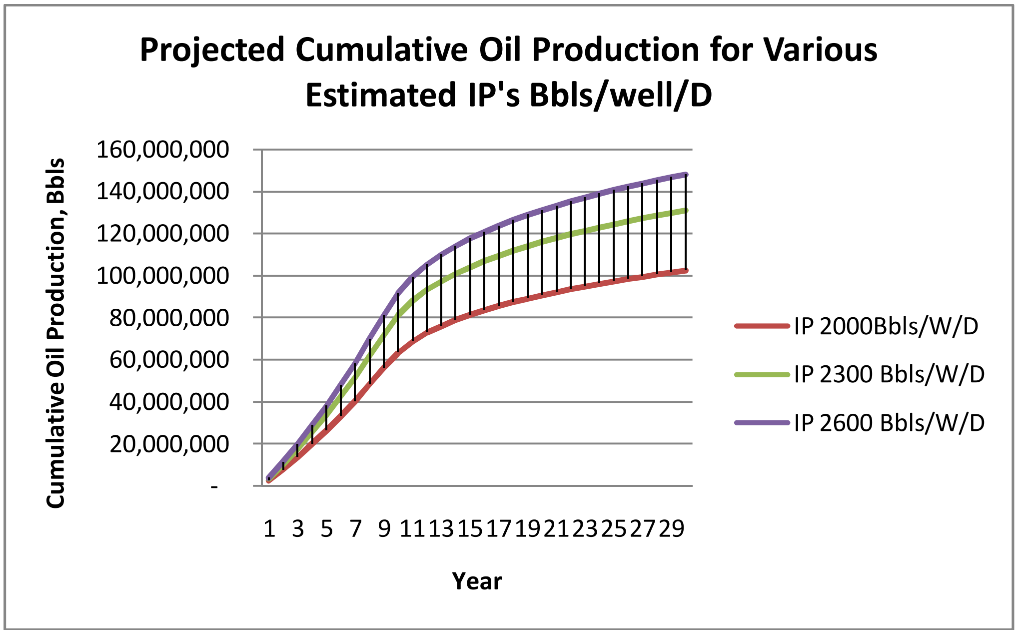

Fig. 32 : Projection of the range of Primary Recovery under the Sunset Vahevala Project.

Appendix A Production Summaries

Performance history of the Point Pedernales field operation with summaries of cumulative oil, gas and water production from wells in different Monterey producing fields are included in this Appendix for reference purposes.

Fig. A1 shows a plot of daily rate vs. cumulative oil production for the Point Pedernales oilfield. Fig. A2 is a plot of producing gas oil ratio vs. cum oil production. Fig. A3 shows the water oil ratio vs. cum oil.

Tables A1, A2, A3, A4 and A5 show tabular summaries of cum production for individual wells in Point Arguello, Hondo, Pescado, Sacate and Point Pedernales fields respectively.

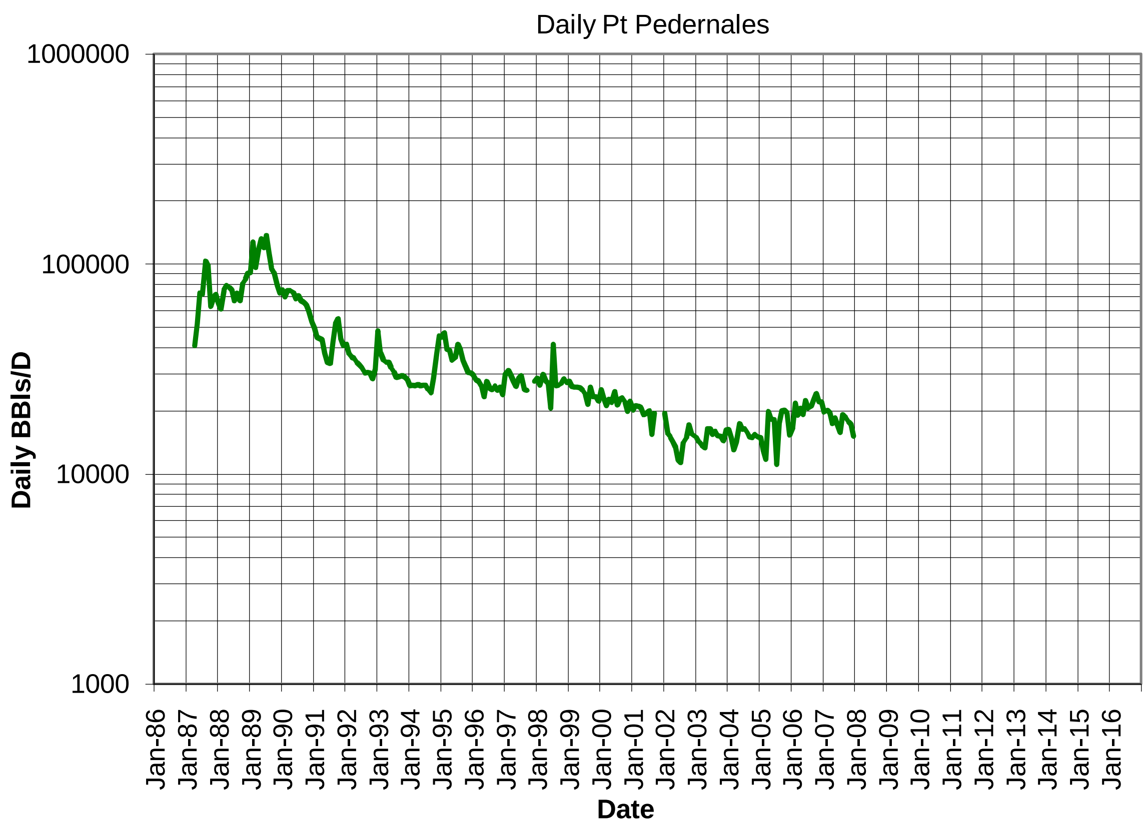

Fig. A1: Average daily production in Point Pedernales Oilfield.

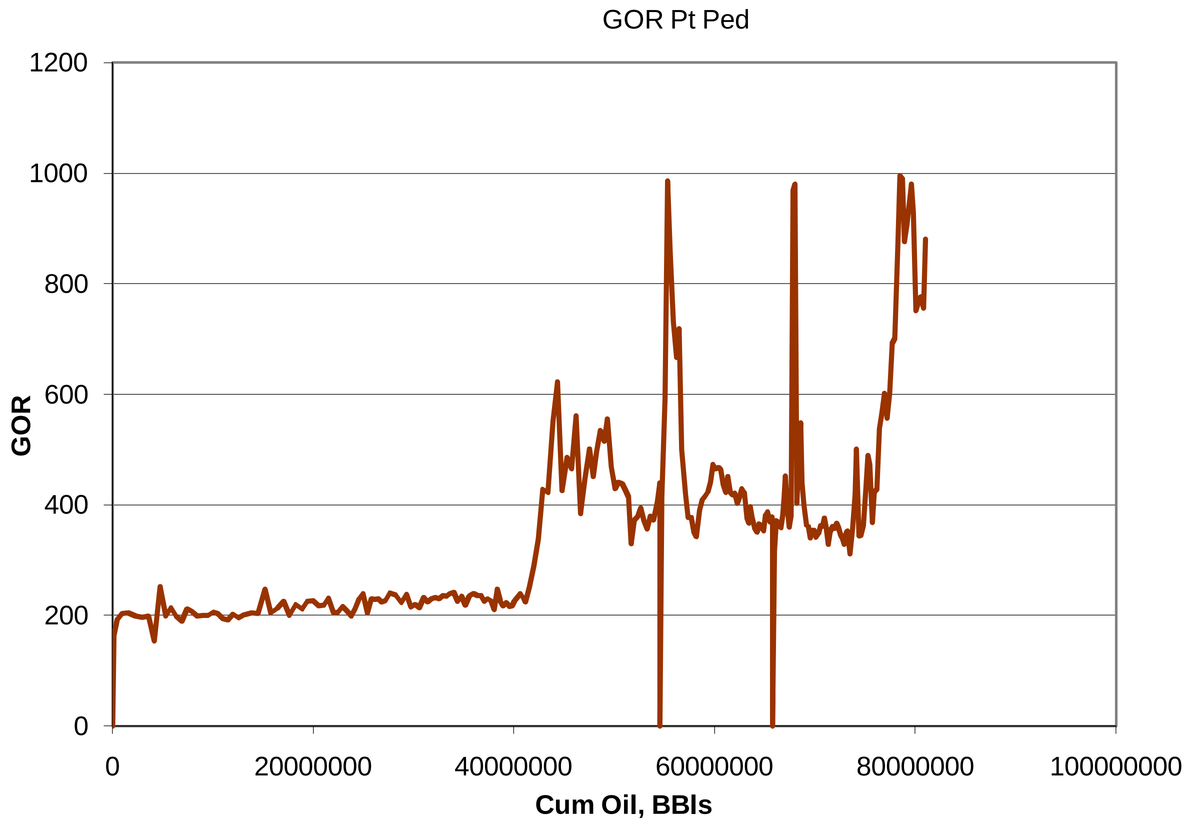

Fig. A2: Producing GOR vs. Cum Oil for the Point Pedernales Field.

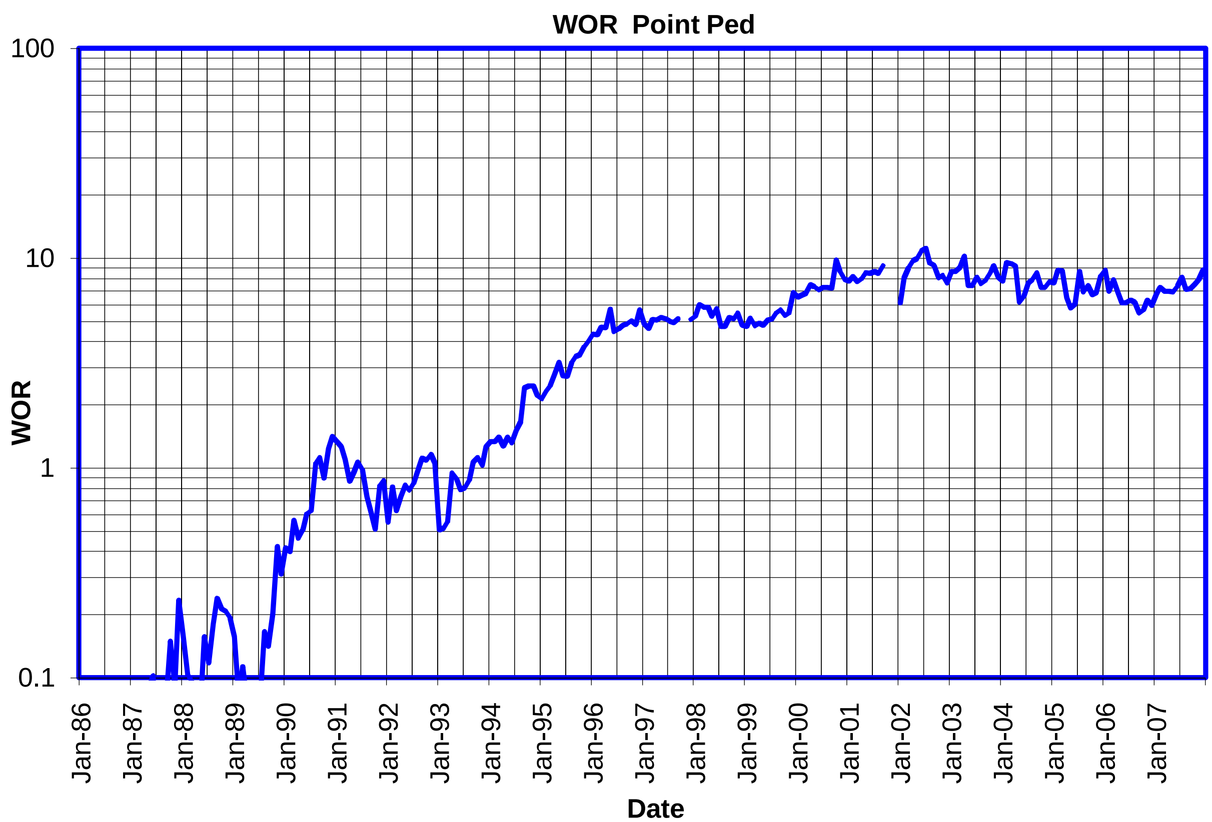

Fig. A3: Water oil Ratio behavior of the Point Pedernales Field.

Table A1: Production summaries for Wells in the Point Arguello Field.

Point Arguello Wells	Cum Oil, STB	Cum Gas, MSCF	Cum Water, Bbls	Cum WOR
A003	13721184	8570179	12807754	0.93
B003	13565902	7650277	7941234	0.59
A004	13084010	10541569	14700043	1.12
B002	12283437	7578863	8227459	0.67
A013	10858321	5394154	22868111	2.11
A006	9700812	5391995	4314065	0.44
A007	8568786	4765203	6540193	0.76
B006	7174890	3837665	1210761	0.17
C005	7004839	3667241	7691573	1.10
B011	6833285	4371172	1820068	0.27
A017	6712840	14240575	12936057	1.93
B001	6374235	4078916	9595905	1.51
B009	5817503	2817038	24093945	4.14
B014	4041692	3765817	7430146	1.84
A008	3361181	1337441	1043701	0.31
B016	3308989	2136643	14272725	4.31
A009	2989335	5922255	1743413	0.58
B017	2842360	1302228	14586747	5.13
C001	2784215	1081963	2186564	0.79
C003	2706158	1473405	1688117	0.62
A005	2675472	1313409	1229218	0.46
B015	2573222	2217903	9128738	3.55
A012	2565907	2899893	4731208	1.84
C004	2548048	1933146	1623361	0.64
C007	2454547	1240535	657210	0.27
A016	2182090	1062896	7939502	3.64
C002	2143317	1500171	3848224	1.80
B004	1939153	989386	261353	0.13
B018	1674573	1808302	7452249	4.45
A014	1573370	5632409	1414158	0.90
B008	1273124	706724	840004	0.66
A002	1154299	1132033	3051146	2.64
C010	1109801	790088	3731921	3.36
C008	947142	884035	3920828	4.14
C011	844889	1765870	1534366	1.82
A015	814798	1708074	5097921	6.26
A019	630432	5580844	950685	1.51
B005	411753	248231	441446	1.07
C009	407486	398370	1193278	2.93
B013	363578	290956	247017	0.68
B010	313700	413961	1468880	4.68
A018	252236	542216	472682	1.87
A010	131948	92040	141924	1.08
B012	125110	169601	136555	1.09
	174843969	135245692	239212455	

Table A2: Production summaries for wells in the Hondo Field.

Hondo Wells	Cum Oil, STB	Cum Gas, MSCF	Cum Water, BBls	Cum WOR
H003	30524948	34731756	2863293	0.09
H009	16199150	55311779	3291558	0.20
H008	12944628	13582927	8980563	0.69
H018	11829330	17489795	6084721	0.51
H029	9540671	31047010	4584256	0.48
HA001	8748227	23876059	4356204	0.50
HA005	8145872	4264745	6519988	0.80
H022	8063272	5696456	3649763	0.45
H007	7274049	26662333	2978186	0.41
HA011	6820425	26284514	1975582	0.29
H034	6666195	4273792	2442888	0.37
HA016	6137019	2073395	2507141	0.41
H037	6021886	2464256	4437776	0.74
HA015	5758134	3255791	1445140	0.25
H027	5534588	6570653	3110947	0.56
HA008	5424737	3660477	5731484	1.06
H031	5407651	3157281	5123526	0.95
HA012	5194086	4011988	1531818	0.29
HA007	4777488	31181481	1155848	0.24
HA004	4485056	5491111	2200347	0.49
HA003	4288206	22802760	2427396	0.57
H033	4203968	2955425	2894074	0.69
H015	4138871	12003909	1027957	0.25
HA017	4091049	772328	2116088	0.52
HA025	3283423	763851	3994740	1.22
H024	3127452	9625805	363875	0.12
H012	3066174	27843493	1117048	0.36
HA014	3061269	3624763	1078973	0.35
HA019	2985240	2330128	3028349	1.01
H006	2927105	2474313	1442100	0.49
HA024	2901744	4398648	2179203	0.75
H006U	2763585	4532136	1694518	0.61
H005	2644407	15995222	1162467	0.44
H023	2513285	27557166	1525493	0.61
H038	2348277	18903316	2048356	0.87
HA009	2332496	662945	496533	0.21
HA021	2317763	8727084	1031622	0.45
HA027	2313418	485751	3143333	1.36
HA013	2252988	2704319	1182729	0.52
HA018	2159759	1150779	2257213	1.05
H001	2092979	1518779	60082	0.03
H017	2060579	1537814	934749	0.45
H014	1816032	1078790	102260	0.06
H002	1719481	13808932	1550533	0.90

Hondo Wells	**Cum Oil, STB**	**Cum Gas, MSCF**	**Cum Water, BBls**	**Cum WOR**
H021	1615019	3314183	181576	0.11
H020	1593823	889323	1201985	0.75
HA006	1574019	1292560	3661974	2.33
H004	1472710	5004706	208236	0.14
HA028	1447668	5778758	1228100	0.85
HA034	1393502	250845	2387531	1.71
H030	1369765	1295533	487752	0.36
H039	1334503	13430732	215444	0.16
HA023	1235997	1748147	1037821	0.84
HA032	1133272	11226272	702454	0.62
H026	1064039	3123359	56067	0.05
HA022	1029982	19392844	551696	0.54
H025	880847	815017	35546	0.04
HA010	864465	3134616	22608	0.03
HA033	766818	318045	1201541	1.57
HA031	705719	173399	1334697	1.89
HA030	406022	3555726	330398	0.81
H028	140096	77495	50311	0.36
H036	119775	216823	690209	5.76
HA029	24889	6114287	27413	1.10
H010	9681	188816	2228	0.23
HA020	29	2295	3243	111.83
Total	263089602	574689836	129449550	

Table A3: Production summaries for wells in the Pescado Field.

Pescado Wells	**Cum Oil, STB**	**Cum Gas, MSCF**	**Cum Water, BBls**	**CUM WOR**
HE005	11239023	3067698	9178321	0.82
HE001	10544146	20485469	2305493	0.22
HE004	10313750	20541445	1599948	0.16
HE011	10135266	3029656	8209516	0.81
HE010	9646140	27611021	3145736	0.33
HE003	8543118	15997027	2827355	0.33
HE007	7050226	6365362	6245612	0.89
HE008	5747757	4623646	5400763	0.94
HE014	5585212	9660898	833907	0.15
HE016	4525104	1636841	2871292	0.63
HE012	4464538	10516780	1604661	0.36
HE015	3834095	1504978	562397	0.15
HE017	3797687	947802	2096849	0.55
HE009	3693474	8802674	980873	0.27
HE023	2851811	5032028	2812454	0.99
HE024	2671704	8406073	1549727	0.58
HE019	2160043	6358637	1299818	0.60
HE018	2107834	1047059	2327153	1.10
HE028	2070283	3588810	858142	0.41
HE031	1900157	856116	1628428	0.86
HE030	1554731	724309	456876	0.29
HE026	1256807	826042	1467841	1.17
HE027	873880	861998	1741681	1.99
HE032	534529	325788	430783	0.81
HE029	201621	73208	241882	1.20
HE033	53332	45350	157261	2.95
HE022	4532	23279	352	0.08
HE021	46	9	27	0.59
HE002	0	0	0	
HE013	0	0	0	
HE020	0	0	0	
	117360846	162960003	62835148	

Table A4: Production summaries for wells in the Sacate Field.

Sacate Wells	Cum Oil, STB	Cum Gas, MSCF	Cum Water, Bbls	CUM WOR
SA001	6,814,369	4,566,737	915,169	0.13
SA003	3,612,919	2,699,710	575,148	0.16
SA002	2,689,657	661,819	1,344,021	0.50
SA009	2,355,221	893,049	1,081,697	0.46
SA013	2,129,156	1,025,078	542,507	0.25
SA007	1,679,141	1,234,983	516,940	0.31
SA004	1,533,112	997,494	1,380,457	0.90
SA011	1,514,787	1,000,797	1,033,786	0.68
SA010	940,236	427,965	678,983	0.72
SA012	310,712	477,261	573,703	1.85
SA014	294,950	446,284	244,995	0.83
SA015	288,027	129,168	862,406	2.99
SA008	123,512	111,303	105,703	0.86
SA006	57,871	542,428	134,481	2.32
SA005	4,474	4,136	13,118	2.93
SA003L	0	0	0	
	24,348,144	15218212	10003114	

Table A5: Production summaries for Wells in the Point Pedernales Field.

Point Pedernales	Cum Oil, STB	Cum Gas, MSCF	Cum Water, Bbls	Cum GOR	CUM WOR
A004	14,217,870	3,383,504	53,962,472	238	15.95
A021	12,539,823	2,967,441	31,268,100	237	10.54
A008	9,471,808	2,138,404	21,989,743	226	10.28
A014	8,721,819	3,413,691	51,347,263	391	15.04
A013	7,434,999	1,614,920	14,659,469	217	9.08
A023	5,026,485	1,137,748	12,619,876	226	11.09
A017	4,184,700	1,131,238	2,658,427	270	2.35
A001	4,109,985	1,593,186	19,726,960	388	12.38
A016	3,778,655	2,329,249	3,423,538	616	1.47
A020	2,349,924	1,384,245	11,132,827	589	8.04
A019	1,838,197	2,774,087	7,856,977	1509	2.83
A022	1,794,149	541,294	9,566,469	302	17.67
A024	1,314,836	1,196,804	5,782,934	910	4.83
A011	991,057	209,429	388,339	211	1.85
A005	519,628	130,332	124,794	251	0.96
A010	499,024	226,660	716,423	454	3.16
A007	463,805	139,501	949,244	301	6.80
A009	431,828	108,352	520,364	251	4.80
A027	397,836	351,588	1,326,107	884	3.77
A025	218,652	355,588	1,668,831	1626	4.69
A028	201,657	443,547	10,106,286	2200	22.79
A018	140,038	37,616	479,953	269	12.76
A003	137,248	32,874	122,475	240	3.73
A012	120,058	108,807	10,044	906	0.09
A006	73,362	26,055	157,929	355	6.06
A026	13,930	35,145	164,565	2523	4.68
Total 12/07	80,991,373	27,811,305	262,730,409	343	3.24